

JULY 24, 1913

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MOTOR AGE





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Each year you have looked to the Cadillac for the real and substantial progress in motor car development.

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Conceive such a process of refinement culminating in an entirely new riding quality of unexampled ease. This is precisely what has come to pass in this new car.

The principal contributing factor—the two speed direct drive axle—is described in detail elsewhere.

The Cadillac Delco electrical system of automatic cranking, lighting and ignition, the first practical system ever made and first introduced by us, has, after experience with it on 27,000 Cadillacs, been still further

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A new source of economy

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The rear springs are six inches longer.

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Front seat passengers may enter or leave the car at either side.

These and many other refinements of essential details make for a greater and a better Cadillac and serve to more firmly establish its position as America's leading motor car.

The Cadillac Company has never disappointed you in the smallest particular or in a single promise.

We promise you again, in this new car, a positive revelation in motor car luxury.

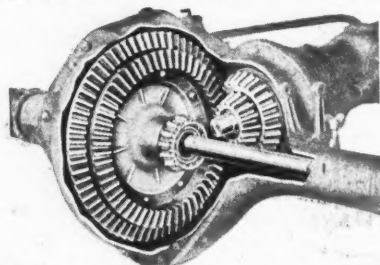
Cadillac two-speed direct drive axle

The advantages of this axle do not lie in its being an improvement so far as its functions as an axle are concerned, but rather in the manifold advantages attained in other directions through the medium of the axle.

In place of the single bevel pinion and single bevel driving gear common to ordinary construction, there are two bevel pinions and two bevel driving gears. This affords two different gear ratios, each driving direct from the engine to the axle without intermediate gearing.

The usual single direct drive gear ratios range from about 3.5 to 1 down to 4 to 1, according to the car. Any single gear ratio is necessarily what it is because a single gear ratio must be, or should be, the particular one which is best adapted for all around general use.

No one single gear ratio can possibly be just right for all speeds and for all conditions. But by using two direct gear ratios we have exactly doubled the efficiency as it concerns the relation of power developed by the engine to the economical and efficient application and transmission of that power to the driving of the car.



In the new Cadillac axle we have, as before stated, two direct-drive gear ratios. The low direct drive gear, which is 3.66 to 1, is especially adapted for city driving, where starting, stopping and slowing down are frequent and where cautious operation is necessary.

The high direct drive gear ratio, which is 2.5 to 1, is of special advantage where speeds of about 16 miles or more per hour are permissible and desirable.

The change from one gear ratio to the other is made by means of a simple, convenient electric switch.

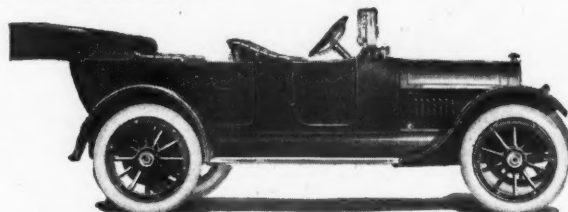
The advantages of the high direct drive gear ratio lie primarily in the fact that with it, any given speed of the engine produces an increase of about 42 per cent in the speed of the car. For example: at an engine speed of 700 revolutions per minute, with the low direct gear engaged, the car will travel approximately 21 miles per hour; while on the high direct gear it will travel approximately 30 miles per hour with no increase in engine speed.

This great increase in car speed in its relation to engine speed accomplishes a number of desirable things.

Among these is a decrease in gasoline consumption for a given mileage. This is due to the fact that with the engine turning over slowly—comparatively speaking—a given quantity of gas is utilized to greater advantage and generates more actual power than with the engine turning over more rapidly. Friction also is materially reduced by reason of the parts operating more slowly and this, too, is a factor in reducing gasoline consumption when driving on the high gear.

Another great advantage is that with this direct drive high gear ratio there is obtained an extraordinarily luxurious smoothness in running, together with a marked quietness and a comparative freedom from the vibration which, to a greater or less extent, is ever present when traveling at high speed with a low gear ratio.

In attaining these much desired qualities, instead of adding complications to the power plant which make for greater fuel consumption and far greater upkeep expense, they have been attained by methods which are strikingly the reverse, viz., by methods which lessen the fuel consumption, methods which decrease friction with its resulting wear and methods which make for longer life, together with an appreciable decrease in the cost of operation and maintenance.



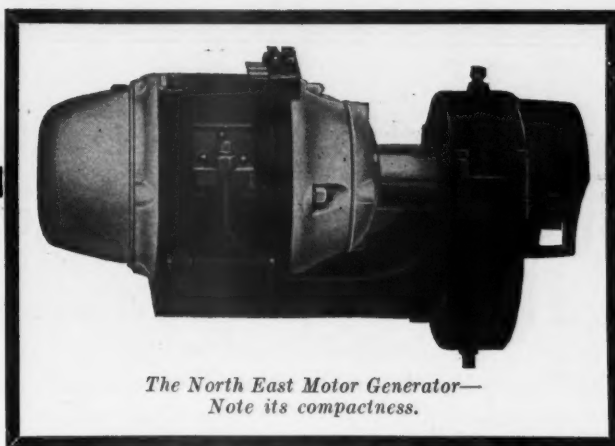
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The North East System does its work smoothly and noiselessly, and revolves the motor at exactly the critical speed to start the engine under any condition without pulling the voltage of the battery down to a point of exhaustion. Gives the same service on hilly tours as on the streets of the city.

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NORTH EAST ELECTRIC CO.
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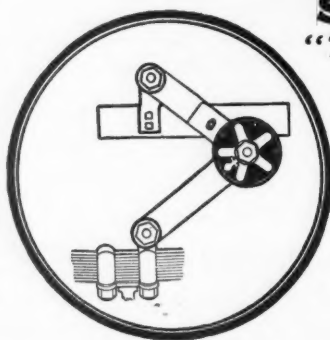
Frictional absorption, as first and only employed in the famous Truffault-Hartford Shock Absorber, has been assigned a new application in the New Automatic—the latest Truffault-Hartford model and the last word in scientific shock absorption.

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These three degrees are positively automatic, responding so quickly and perfectly to a change in the road surface that the car rides with equally luxurious ease on all roads—rough or smooth.

The first degree of tension, while extremely slight, suffices to destroy the disagreeable spring oscillation generally quite evident in travelling over a smooth road surface at high speed.

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The third degree serves the dual function of not only insuring the comfort of the car's passengers on abnormally rough roads, but in acting as a sure and effective control for the springs in case of sudden and speedy contact with car tracks, deep ruts, or high bumps frequently seen too late to slow the car down.

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"The Pioneer Shock Absorber"

Unlike many other devices the New Automatic is attached without detriment to the car's appearance. Write for catalogue giving complete information on this and other models.

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MOTOR AGE

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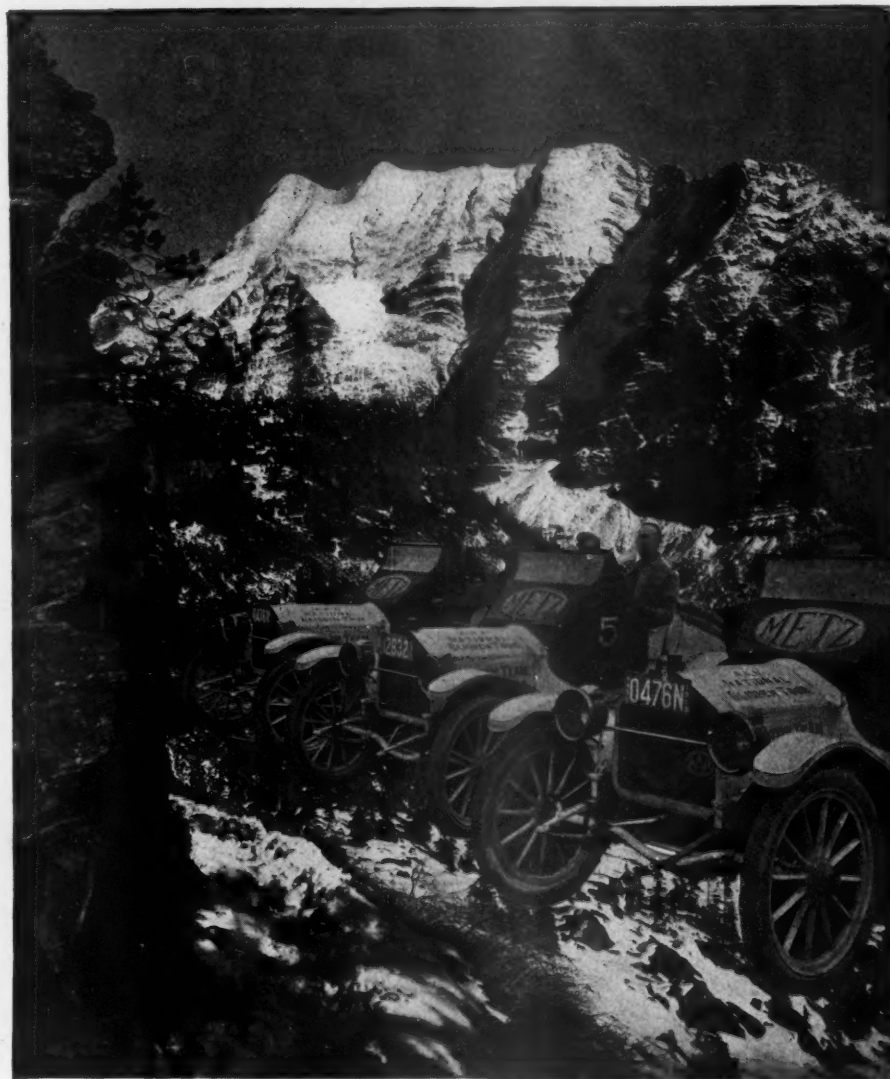
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MOTOR AGE

National Tour Trophies Awarded



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METZ TEAM, WINNER OF GLIDDEN TROPHY. MOUNT JACKSON IN BACKGROUND FROM TRAIL OVER GUNSIGHT PASS

GLACIER PARK STATION, MONT., July 19—Special telegram—After a 7-day drive of approximately 1,300 miles across the states of Minnesota, North Dakota and Montana, seven of the twenty contesting cars that left Minneapolis July 11 on the ninth annual reliability run of the American Automobile Association checked in here this evening at 7 o'clock with perfect scores.

The imaginary roll of honor is inscribed

By J. E. Smith

with the names of the three Metz cars, the two Hupmobiles, the No. 10 Krit and the No. 20 Locomobile—seven unmarked entries that qualified for the four trophies offered in this year's competition.

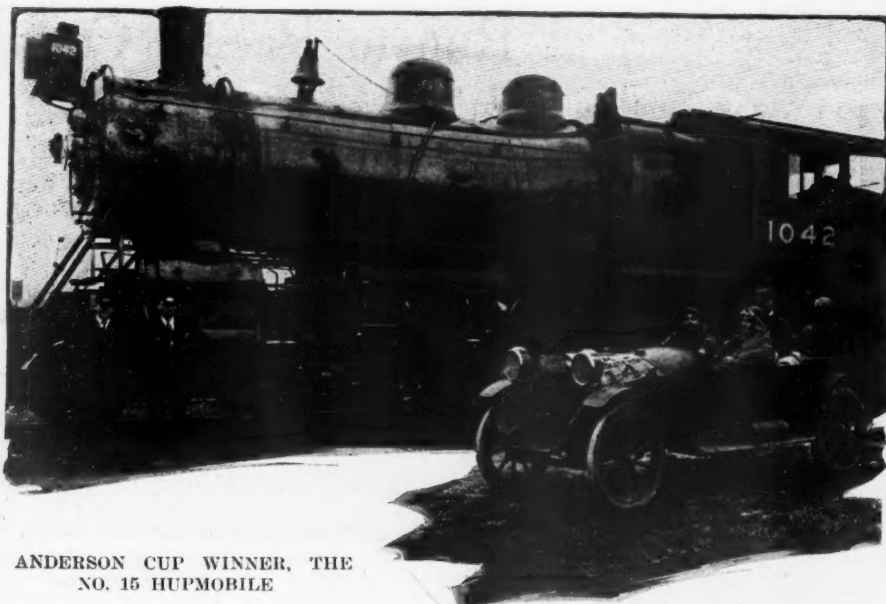
The historic Glidden trophy will be taken back to Boston by the Metz drivers, who captured the team prize after a sensational battle with the sturdy Hupmo-

*Metz Team Wins Glidden Cup,
Hupmobile the Anderson,
and Dr. J. D. Park, in
Locomobile, Takes
A.A.A. Emblem*

biles. The handsome A. A. A. trophy for touring cars has been awarded Dr. J. D. Park, of Duluth, Minn., who piloted a 1908 chain-drive Locomobile—a gasoline pioneer with a mileage record of over 110,000 miles—across plains and over mountains without receiving a single demerit. E. E. Alfred, who toolled the No. 15 Hupmobile, will return to Minneapolis with the Anderson cup, having won the runabout division prize in the drawing. An additional award of merit and proof of L. Catcart's luck, the Minneapolis News cup will keep the Glidden trophy company in the journey to Boston, the driver of the No. 5 Metz being successful in drawing for this tankard, which was hung up for cars competing in the runabout class.

Dr. Park's Locomobile was the only machine in the touring car class to complete the journey without receiving penalization, the No. 2 Premier getting 5 points, the No. 12 Velie 20 points and the No. 18 Locomobile 380. Two out of the three teams entered for the Glidden trophy—the Metz and the Hupmobile—finished with perfect scores, two cars in the Krit flotilla meeting with misfortune. Six machines—the three Metz, two Hupmobiles and No. 10 Krit—qualified for the Anderson and News cups and forced the officials to transgress the laws of Uncle Sam in regard to the holding of lotteries and prize drawings. In the runabout division the No. 11 Kissel received 142 black marks and the No. 16 Little 163 points.

The Metz team nearly lost its chance to win today when a steering knuckle on one of the Boston entries broke, but the crew of the train welding plant repaired



ANDERSON CUP WINNER, THE
NO. 15 HUPMOBILE

the break at the noon control, Shelby, and saved the invaders from Boston a penalty. Dr. Park also had to step on the throttle of the Locomobile in order to check in on time, driving 21 miles in 69 minutes and arriving at Glacier Park Station with only 1 minute to spare. The No. 14 Hupmobile covered the last 14 miles of the run on two rubberless rims and arrived 1 minute ahead of schedule. The driver, C. I. Munzer, collapsed at the conclusion of the tour from the fear that he was late.

Longest Drive of Tour

Today's morning drive was the longest of the run—112 miles to Shelby, Mont. Although the roads were sandy, choppy and stony in turn, they were on the whole satisfactory as reliability highways. Several tortuous hills were climbed in safety as the roads were dry. The afternoon run was across ranges, with two fords and two dangerous hairpin turns, and for the last few miles over a portion of the first motoring road in a national park, built by Louis W. Hill.



LOUIS HILL IN FULL WAR REGALIA



A band of 100 Piegan Indians, belligerent in war paint and astride picturesque ponies, escorted the tourists into the park and then formed a circle around the machine while the drivers were parking their cars.

The official car—the Winton six—in which rode President Laurens Enos, of the A. A. A.; A. G. Batchelder, chairman of the A. A. A. executive committee, and H. J. Clark led the procession into Montana's playground with Referee C. E. Dutton following in the role of pace-makers.

Tourists Go Sightseeing

Counting the non-contesting cars, there were more than thirty machines in the motoreade.

President Enos and Chairman Batchelder leave Tuesday for Lake Tahoe, where they will join the Hoosiers who are motoring from Indianapolis to San Francisco. Several of the tourists are planning to go farther west, some will visit the Yellowstone and others drove to Lake St. Mary, where they will spend 3 days in sightseeing before returning on the special train which leaves for the return trip to Minneapolis Tuesday evening.

Although there were fewer cars entered in this year's competition than in the eight contests held previously, the 1913 Glidden tour was a successful run and much splendid missionary work was accomplished in arousing interest both in motor cars and good roads. The motor migration to Glacier park was more in the nature of a tour for private owners than a manufacturers' proposition and the amateur drivers proved themselves anything but tyros in piloting machines over the most difficult highways in three states.

Welcomed by Daring Aviator

This year's run was one of continuous entertainment for the participants. On the morning run today an aviator met the tourists 10 miles from Havre, Mont., and, circling above the cars, dropped a letter of welcome and the key to the city. A delegation from Havre, headed by the mayor, joined the motorists 23 miles from the city and escorted them to the noon control. Here a coterie of twenty pretty Montana maidens welcomed the travel-stained pilgrims and presented a corsage bouquet to each woman and a boutonniere to each of the men.

After stopping at Williston, N. D., Wednesday night, the tourists crossed the state line into Montana at Mon-



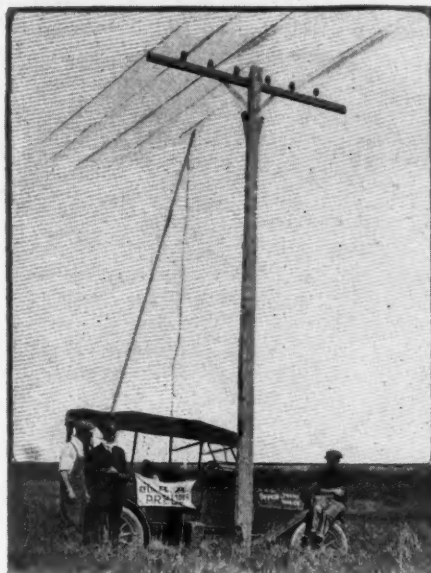
DR. PARK AND PIONEER LOCOMOBILE,
WINNER OF A. A. A. TROPHY

dak the following morning and continued on to Glasgow where the hotel train was sidetracked for the night. At Buford, 22 miles out of Williston, the historians got busy and recalled that the town was rich in tradition connected with Custer's last charge. To the left of the railroad station stands the little hotel where Custer stopped the night before the massacre and the green building to the left of the old fort is where he turned and went out to his brave death.

Two cars were damaged on the run from Williston to Glasgow and one was compelled to withdraw from the contest. The unfortunate entry was the No. 4 Marmon, driven by Bohn Fawkes, which was classed with the perfect score contestants until the clutch burned out, forcing Fawkes to send the car back to Minneapolis. The pacemaker, a Mitchell six, broke a steering knuckle.

Hoosier Tourists on Last Leg of Run to Pacific Coast

Indianians Report Many Thrilling Desert Experiences



GLIDDEN OPERATOR TAPPING WIRE TO SEND DISPATCHES

GOLDFIELD, Nev., July 22—Special telegram—Eighteen cars of the twenty that left Indianapolis July 1 on their run to the coast reached Goldfield this evening. Two have fallen by the wayside but both are expected to catch up with the tourists before the journey's end at Los Angeles. The latest to get belated is the Pathfinder, which ran from Indianapolis to Denver with its bonnet sealed.

Seventy miles out in the desert from Ely, Nev., last night while the Pathfinder was assisting one of the local escort cars out of an alkali sink a roller bearing on the driveshaft gave way. The passengers rode into Ely on the Premier schooner, but a new bearing was not obtainable. A local car was sent out to assist Bob Spiegel, the driver.

By Darwin S. Hatch
Staff Correspondent

The Brown truck which was delayed in Colorado has been driving night and day in an effort to catch up with the tour, but was delayed by swollen streams in arroyos and washouts and again was held up by broken springs 50 miles from Cisco, a ranch town in the middle of the Great Utah desert.

All the other cars are coming through with flying colors, a thorough proof of their staunchness in view of the miserable condition of the roads through Utah. From the Colorado border, which was left 1 week ago, to the Nevada line, crossed yesterday, there were no roads which were worthy of the name with the exception of about 40 miles around Salt Lake City. The trip across Utah took 5 days and covered 700 miles and every foot of the way was desert with the exception mentioned. This was not the fault of the Utah people, but there are not enough of them to make an impression on the desert trails. Often the work of whole counties on a single bad piece of road would be found to have been undone by a cloudburst the night before the tourists passed.

No greater energy could be displayed than that of the people of Price, Utah,

who built an entirely new road through Price canyon where only one car, Westgard's, ever had passed, and that took several days. The new road let the tourists through in less than an hour, but it is a mere shelf cut in the side of the cliffs, too narrow and with too sharp turns and narrow steep grades to be negotiated with safety by the amateur. Where one drives 50 to 100 miles without seeing evidence of human habitation, the desert and the mountain torrents play havoc with roads. Nevertheless, the scattered hamlets, a day's journey apart, exhibited the keenest interest in the tour and its dual object, the cars and the Lincoln highway. Bands, speeches, enthusiasm and bunting were the rule and the colors of the Midland trail, the gold and black, appeared wherever humanity could exist.

Salt Lake City's scheduled stop of 2 days was shortened to 1 and the side trip to Ogden omitted because the tourists got behind in their schedule in the desert. Nevertheless there were baths at Salt Air beach, organ recital in the great Mormon tabernacle and a banquet of 500 covers.

The Sunday run through the desert

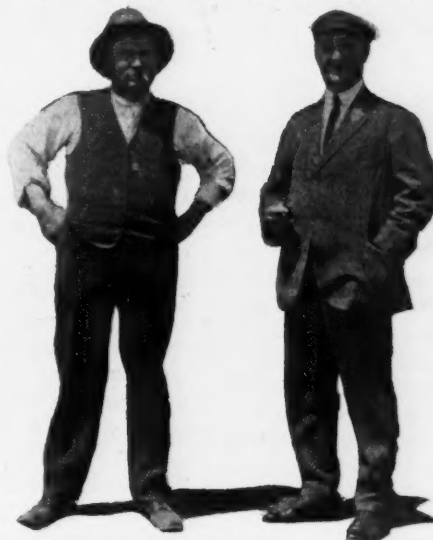
to Kearney's ranch, an oasis 150 miles from Salt Lake City, was a typical desert trip except that through an error in routing the tourists were sent over Dugway pass, a grade that no car had attempted to negotiate in 3 years. It was a long grade, averaging about 18 per cent. The sixes got over nicely, but most of the fours had to be pulled or pushed.

The tourists pitched camp in the rain. From the ranch a run of 125 miles was made to Ely, Nev., over the desert. At Ely they were met by Governor Oddie, who will accompany them to the California line.

At 8 o'clock tonight the Premier prairie schooner was not in sight. It was last reported at Hot Creek, 110 miles out in the desert.

Camped in the Desert.

Green River, Idaho, July 16—Seven cars of the nineteen Indiana-made machines were forced to halt and their passengers obliged to camp tonight in the middle of the great desert of eastern Utah, by a cloudburst. This made the roads a sticky mass 6 feet in depth, besides washing the



MONTANA SHERIFF AND PRESIDENT ENOS, A. A. A.



PHOTOGRAPH OF GLIDDENITES AT WILLISTON, N. D., TAKEN AT 9:30 AT NIGHT



IN THE ROCKY MOUNTAINS BETWEEN DENVER AND IDAHO SPRINGS, COLO. MCFARLAND CAR IN FOREGROUND

road out in places and filled the hundreds of arroyas and gullies with water. It is expected that tomorrow the belated tourists can come through, although this will necessitate some night driving for them. The cloudburst was the first rain in that section for over 6 months.

For the tourists that got through to Green River, the last 50 miles of the day's run resolved itself perforce into a desert race with the rain and the last car through, the Marion carrying W. McKay White, chairman of the tour, forded dozens of arroyas rapidly becoming torrents and which 15 minutes before had been dry washes. The sixty-five tourists who reached Green River will wait till the others come in tomorrow before continuing their run.

In addition to the cloudburst and the race against the elements, today's run of 120 miles from Grand Junction was replete with thrills for all the tourists. It had rained for several hours in Grand Junction last night—the first rain in many months—and the roads were very slick or else deep in mud. Even with chains it was difficult to hold the road, several of the cars skidding off high grades or into irrigation ditches.

Colorado's Fruit Country

Between Grand Junction, the heart of Colorado's fruit country, to Green River, Utah's 6-year-old fruit valley, two oases in the vast waste, the motorists traversed desert—and desert only. Leaving Grand Junction there was a 20-mile stretch to Loma through Fruita, over clay roads which would have been excellent in dry weather, but which had become treacherous from the rain. The road is lined with prosperous orchards of apple, peach, apricot, cherry and pear trees with berries, alfalfa, wheat and oats between them.

Alongside the road runs the irrigation ditches and into one of these the Marion skidded a few miles out of Grand Junction. It was extricated with little difficulty.

New-Made Roads Sticky

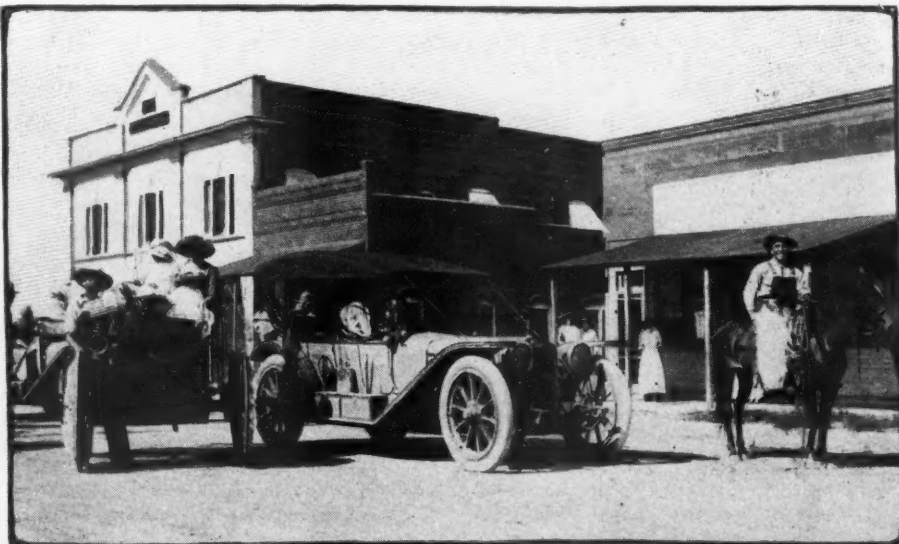
New-made road from Loma to Mack was still sticky and just out of Mack one of the Americans skidded to the side and went in up to the running boards, but was pulled out in a hurry by the team-mate.

From Mack westward the entire run was through the desert over roads that are just being constructed. For most of the 100 miles through the desert an abandoned grade of the Denver and Rio Grande railway is utilized. It had not been rained on since remaking for a roadway and was very soft sand and gumbo, but level. The bridges and culverts have burned or rotted out and to cross the gulches, gullies

and arroyas which break the grade every few hundred yards, it was necessary for the road to leave the grade and wind among the sand hills only to return to the grade at some other point. The roadbed on this grade is very narrow, rarely with room for two cars to pass, and if the wheels get within 6 inches of the edge the soft dirt lets them slip down.

Desert Most Desolate

The desert is about as desolate a country as can be imagined—red and white sand, sparse sage brush, alkali deposits and prairie dogs are the sum total of the immediate scenery. At a distance are bare sandstone cliffs in brilliant reds, yellows



OLD STYLE HORSELESS BUGGY AND MODERN MOTOR CAR POSE FOR PICTURES

and white; carved in every imaginable shape; while blue mountains rim the desert and by their very height make it the Valley of Death it is. Blinding sandstorms spring up without apparent reason, the heat is terrific. Today the thermometer registered 98 in the shade and temperature in the sun was impossible to obtain as the thermometer was capable of only 120 degrees.

There is no water, no houses, no signs of human life, except the railroad and about every 50 miles a water tank on the railway line or a water hole—necessary oasis to tourists.

Green River is in a valley some 12 miles in length and a few miles in width along the Green River. Fruit is the chief industry although a growing one is the mining of ore from which radium comes. Another infant industry is oil. This is undeveloped as yet.

Price Oasis in Desert

Price, Utah., July 17—An oasis in the middle of the Great Desert of Utah, a veritable garden in a vast wilderness of bare cliffs and drifting sand, greeted the tourists as they drove into Price this afternoon after a run of 75 miles from Green River. All of the eighteen cars in the tour from Indianapolis, except the Brown truck, are on hand. The latter has replaced its differential and is driving day and night to catch up. It was last reported at Grand Junction and probably will be with the rest of the Hoosiers as they leave Salt Lake City next Sunday. This truck is carrying the heaviest load of any in the tour and is making a remarkable showing in spite of its accident.

Originally, Salt Lake City was scheduled as the stop for tonight. This would have necessitated a run of between 200 and 250 miles for the day, a feat almost impossible over these desert roads. This, in conjunction with last night's delay for the seven cars held up by the cloudburst, determined W. McKay White, of the Marion factory, chairman of the tour, to shorten the distance and make Price the night stop. As it is, tomorrow's run to the Mormon metropolis will require a 6 o'clock start, if night driving is to be avoided.

Marooned in Desert

Early this morning the twenty-five tourists marooned in the desert drove into Green River, where the more fortunate balance of the Hoosiers awaited them. The party then got under way for Price. Throughout the whole day's trip the Indians threaded their way through the desert sands, the Midland trail—until 2 weeks ago simply wheel tracks winding around the shifting sand hills and skirting the brilliant sandstone cliffs, ducking in steep grades the sharp turns into arroyos, dodging along the bottom of a dry creek where the alkali dazzles the eye, only to scramble up the other side and repeat the performance; this trail has in the last fortnight been worked by practically every citizen in the counties



TOURISTS AT THE COLORADO-KANSAS LINE

through which it passes until now every foot of the way is negotiable, by motor cars, the small dry washes filled, the gullies and arroyos graded, the sagebrush and cactus scraped off and the surface dragged over nearly every foot of the 350 miles of desert between Mack, Colo., and Salt Lake City.

Yet the desert is still a desert, and a waste such as only those who have crossed it can imagine. The road is a desert road despite the valiant efforts of a people whose density of population averages nothing to the mile for 50 miles at a stretch. The roadbed is sand usually 3 or 4 inches deep upon which the infrequent rains make little impression, for the water simply rushes down the gullies without soaking in and doing any good. If not sand, the road is "dobe," good most of the time, but practically impassable after water has fallen on it. On the lower levels the land is mostly drifting sand, practically bare as to vegetation and tenanted only by buzzards and hawks, whose grim mission is evidenced by the skeletons of horses which have perished of thirst. Even

the prairie dogs and rattlesnakes have abandoned it, and the occasional coyote lopez through it without pause.

On the middle levels, either sand or "dobe" is the rule, covered with a sparse growth of sagebrush, greasewood and cactus and inhabited by prairie dogs and coyotes. There may be other tenants of the waste, but if so they remain discreetly in hiding while the laboring motors can be heard. On the higher levels of the desert scrub cypress is the vegetation, while the tenants of the lower levels are here in greater numbers and bronze and black eagles sail above. The heat is intense when out of the wind, but where the continual breezes may strike one it is not so noticeable.

Such was the road today and most of yesterday, and such must it ever be if the resources of the inhabitants of the occasional oases are to be relied upon wholly. The first water point, which means the first habitation of man, is the town of Desert, 13 miles westward from Green River. This is on the D. & R. G. R. R., which is followed roughly most of the way. The town consists of a general store and a water tank, which is the reason for the existence of the store. The water supplying the tank is pumped 5 miles from the Green River.

Six Houses in Woodside

The next water is at Woodside, likewise on the D. & R. G. It has six houses and is 12 miles farther. It has a hot artesian well. Every 3 minutes the water boils over, spouting up to a distance of 4 or 5 feet above an 18-inch pipe. It then subsides and for 3 minutes a menacing rumble and hot gases are the only evidences of activity until it again boils over. The well is 3,200 feet deep and was tapped by the railroad company, which abandoned it when the boiling water proved unfit either for drinking or for the



TOUR OFFICIALS WORKING AT NIGHT

locomotive boilers on account of the mineral impurities it contains.

There is plenty of water that is sweet in the Price river most of the time. This must be forded, however, and with caution as, if the direct line across the river is missed, the car will become mired down in quicksand, as happened to the writer's car which had to be pulled out by the Premier truck.

Replenishing Water Supply

Big Spring ranch, which owes its existence as its name to a natural spring, 25 miles to the west of Woodside, is the next point at which water bags and radiators may be filled. The spring is used for irrigation and the rancher has reclaimed possibly 60 acres of desert upon which he raises fruits and alfalfa. Some 22 miles farther is a small town on the Price river. The land along the river is under irrigation and is raising fruits, alfalfa and desert hay in profusion.

Five miles farther is Price, a town of some 5,000 people, with a business district, city hall, courthouse, high schools and other public buildings that would do credit to a city of ten times its size. It is almost wholly a Mormon settlement, and the strength of the Latter Day Saints in the community can be judged from the fact that the city hall is employed as the tabernacle, while the new \$60,000 temple, now nearly completed, is under construction. A new hotel compares favorably in size and appointments with the hostleries of the east.

The prosperity of the town is due to the fact that it is the supply for a territory 100 miles in radius. Sheep and cattle ranching are the original industries, but a newer and rapidly developing industry is coal mining. There are eighteen coal mines in the Wasatch mountains within 20 miles of the town, producing 10,000 tons of bituminous coal daily and employing 10,000 miners.

Cars Standing Rough Trip

So far as the cars in the run are concerned, there is little to say, as all are coming through in fine shape. Of course, the condition of the roads and the excess baggage the cars are carrying preclude what would amount to perfect scores, were the run a reliability contest, and equally of course the drivers stop to make adjustments and repairs that they would not stop for if penalties were assessed. No official record is made by which a comparison could be drawn, but the run is demonstrating beyond doubt the reliability and staunchness of each entry, and the ability of their drivers under the most adverse conditions imaginable.

Smallest by far of any car in the run is the little Empire, and under the clever piloting of Joe Moore, it is demonstrating its ability every inch of the way. Likewise the two Marions, the one a roadster and the other a touring car, under the guidance of Gager and Nichols, respectively, and carrying an unusual amount



GENERAL VIEW OF BEETHOUD PASS ON ROUTE BETWEEN DENVER AND IDAHO SPRINGS, SHOWING LINEUP OF HOOSIER TOURISTS

of excess weight, are checking in at controls with flying colors.

The two Haynes cars, driven by Wagner and Enders, are carrying some heavy weights in the way of celebrities in addition to the 5,400 pounds of total weight. In the one car is Elwood Haynes; C. A. Branston, the English motor car engineer, while the other Haynes has as a passenger W. J. Morgan, of New York. The machines are running on Indiana air in spite of their excess weight in gray matter and are making a good record.

Likewise the two Appersons with Max Winters and Nelson McLain at the wheels are slipping along the roads in an uneventful manner. There is little to say about them because nothing ever happens to them, a touring requisite.

The two Premiers simply are duplicating the records they have made in previous transcontinental runs. The one with Ray McNamara, the veteran cross-country driver, at the wheel, carries J. M. Ward, the secretary of the association. The other, piloted by Speedway Duncan, carries A. L. Westgard. The Premier acts as pilot car, spreading the confetti for the rest of the cars, and taking the bumps before putting out warning signs for those behind.

Underslinging as a factor of safety in transcontinental touring was given a practical demonstration when one of the Americans slid off a grade in the desert at an angle such that the passengers fell out. Its low center of gravity prevented the car turning over, and it was gotten back on the road without being capsized. The other proved that it had sufficient clearance for its job when it went to the running boards in the mud and got out as soon as traction was provided. The Americans are piloted by Charles Boyden and Edward Gouth.

The Pilot, with Russell Gaar at the

wheel, is pursuing the even tenor of its way without incident, accident or thrilling experience on which to hang a story. This is due not only to the staunchness of the car, but to the skill of its driver, for whom transcontinental travel is no novelty.

The McFarlan six, too, is having a distressingly tame trip. All it does is ford arroyas full of rushing water and travel gumbo mud through the bad lands in the middle of the night. This car is handled by Bert Adams and carries as one of the supercargoes Christopher Cox, official route maker for the Automobile Blue Book.

Henderson Driving Himself

R. P. Henderson is demonstrating that he is as much of a success as a road driver as he is at making and selling cars. He is putting his Henderson six across the country in fine style, only one forced stop of any importance being made so far and that was to bridge a washout in the road that occurred almost under his front wheels.

COLE HOLDS BIG CONFERENCE

Indianapolis, Ind., July 21—Distributors of the Cole and representatives of companies manufacturing parts entering into the construction of the Cole were the guests of the Cole Motor Co., Thursday and Friday of last week. The purpose of the meeting was to analyze economic standardization with relation to the motor car.

Homer McKee, director of sales and advertising of the Cole company, presided over the conferences. In addressing the gathering, J. J. Cole, president of the company, said:

"The idea is to obtain the best possible parts in big vital units from the recognized specialist in each instance and to blend these parts into a harmonious

mechanical whole. The fact that each specialist is recognized as a standard among his kind insures maximum quality, and the fact that these specialists buy in vastly larger quantities than their competitors insures cost reduction."

Among those who addressed the conferences were: A. D. Knoblock, Northway Motor Co., Detroit; Edward Hammond, Gemmer Mfg. Co., Detroit; R. F. Firestone, Firestone Tire and Rubber Co., Akron, and Edward A. Walton, Timken Axle Co. There were also representatives of the Delco electric system, Stromberg carburetor, Collins curtains, Taylor tire pump, Spicer universal joints and of the Stewart-Warner speedometer present.

BOOTH A STUDEBAKER CHIEF

Detroit, Mich., July 22—From the headquarters of the Studebaker Corp. comes the announcement of the resignation of James Newton Gunn, as general manager of the motor car division and member of the executive committee. Mr. Gunn is the head of the firm of Gunn, Richards & Co., engineers and accountants, and due to the pressure of his private business he has felt the necessity of severing his connection with the Studebaker interests. His resignation was accepted at the board meeting in New York on July 16, at which time he was requested to continue as a director of the company. He has been succeeded by Clarence H. Booth, formerly assistant general manager.

NEW CORREJA SIX ANNOUNCED

New York, July 22—Vandewater & Co., Elizabeth, N. J., have announced a six-cylinder Correja car. This vehicle has a 3.5 by 5-inch motor, cylinders cast in a block, with valves arranged in T fashion. The three-speed gearset is carried on ball bearings on the rear axle. The other mechan-

Pelletier Becomes Car Manufacturer

Maxwell Official Buys Flanders Electric Plant

DETROIT, Mich., July 22—E. LeRoy Pelletier, advertising director of the Maxwell Motor Co., has purchased from Harris Bros. & Co. plant B of the Flanders Mfg. Co. group at Pontiac, Mich., and has organized the Tiffany Electric Car Co. to continue the manufacture of the Flanders electric and also build a new line of electric cars under the name of the Tiffany de Luxe and Tiffany Mignon.

Associated with Mr. Pelletier in the venture are several business men of Detroit who are stockholders in the \$500,000 company that is being incorporated. The property inventoried at \$306,000, but the purchase price has not been made public.

Although he will act as president of the new company and direct its sales and advertising policy, Mr. Pelletier will continue to serve the Maxwell Motor Co. as advertising director and leave all the re-

sponsibilities in the Tiffany company to Don McCord, general manager of the new corporation.

The present design of the Flanders electric is to be adhered to and a second and larger model is to be placed on the market. The Tiffany Mignon will be the smaller car and will list at about \$2,250, and the larger model at \$3,250. This latter car will contain a self-charger by which it will be possible to charge the machine from either a direct or alternating current.

In acquiring the former Flanders property, Mr. Pelletier also acquired the patents and machinery for the manufacturing of the Wallwork worm gears and a separate company will be organized to make these gears for the trade as they are now in general use by all manufacturers.

ical features are along the line of Correja experience. The body is a five-passenger touring type suspended on three-quarters elliptic springs.

LOZIER ABANDONS BRANCHES

Detroit, Mich., July 21—Believing that its business interests and customers are better served by capable agents than by branch houses, the Lozier Motor Co. has just closed its branches in Chicago, Boston, Philadelphia and San Francisco. The dealers who have taken over Lozier branch business in the various cities include three new companies specially organized for the purpose. Harry S. Houpt, Inc., New York City, Albert W. Woodruff, Inc., Boston, and the Bigelow-Wiley Motor Car Co.,

Philadelphia, are the companies which have just been organized. The Bird-Sykes Co. of Chicago has taken over the distribution of Lozier cars in that city. The Bekins-Speer Motor Car Co. of Los Angeles, which has handled Lozier cars in that city for the past 3 years, has taken possession of the San Francisco branch and will operate it as an agency.

HARTFORD WINS DECISION

New York, July 21—To the Hartford Suspension Co., in its suit against the Western Mfg. Co., has been awarded damages amounting to \$30,572.76, according to report of the master, Henry D. Oliphant, who was appointed by the district court of the United States and the district of New Jersey, following the favorable decision given the Hartford company in its suit against Western company for infringement of the Truffault-Hartford shock absorber patents. The final decision in favor of the Hartford company resulted in a permanent injunction against the Western company.

VELIE AGENTS MEET

Moline, Ill., July 21—The annual conference of Velie agents is being held here and is unique in that they are encamped in a canvas city, 200 tents, each holding two men, having been pitched at Camp Velie. The dealers are inspecting the new Velie light six and the two four-cylinder models.

ADAMSON SECURES INJUNCTION

East Palestine, O., July 19—Judge Anderson, in the United States district court, has issued a temporary injunction in favor of the Adamson Mfg. Co., restraining the Marshall Iron Works from making or selling portable fire vulcanizing devices infringing on patent No. 1,057,911.



HOOSIERS STOP AT FIRST CAPITOL OF KANSAS



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The Local National Tour

IT IS to be regretted that what was once the greatest national motor tour in the world has now degenerated into what might be termed a local contest, a contest for one section of the country, but with trophies of national importance hung up as prizes. The American Automobile Association, which conducts the tour, should insist that a percentage of the entries should be from territory outside of that traversed by the contest; in other words, only a small percentage of the entries, a minority, should be from the immediate territory. By doing this the contest will continue to be of national importance, otherwise it forfeits all rights to be known as an event of national caliber, and takes its place with local contests conducted in a dozen or more sections of the country. America needs one great national tour. It must be a national one and not a local event.

All-Night Repair Shops

IN AT least a dozen of our leading cities through which there is heavy tourist travel there should be one all-night repair shop in each city. In many parts of the eastern states the tourist traffic is increasing at a fast pace. It is true that many of our motorists who used to spend months abroad now are seeing America first. It is necessary to do everything possible to help make such traffic as easy as possible and the intelligent all-night repair shop is one way in which much can be done.

MANY tourists are late in reaching the night stop and they are particularly so if they have experienced trouble during the day which has delayed them several hours. To such the all-night repair shop is an essential if the touring schedule is to be maintained with any certainty. With such a shop competent help is needed. Many shops are woefully lacking in this respect. They take boys little over 15 or 16 years of age and set them at repairing tires or making minor adjustments on the car. Their work is a failure nine times out of ten and often sets the tourist back half a day or longer. Some standard of workmanship should be insisted upon. A workman to qualify should have to show not only ability to make repairs, but a knowledge of car systems and the most important parts of various makes of cars should be demanded of him by his employer.

IT IS nothing but a form of highway robbery the way repair work is done in some places today. A recent example showed a workman without a drop light endeavoring to trace the wiring in a combined electric lighting and starting system. After spending over half an hour in such procedure he announced that it was impossible to do the work in their shop. Not a minute of intelligent effort had been expended on the work.

OTHER examples are heard of at every dinner table. Frequently the repairman cannot be relied upon to patch a tire or vulcanize an inner tube. If there has been a bad puncture only one side of the tube is vulcanized instead of the other. If the tube has been pinched and the rupture is $\frac{1}{2}$ inch in length, the repairman does not know whether a patch will hold or if it is a job for vulcanization. This lack of accurate information apparently is general and the tourist must pay for the work every time. After he has paid for it he frequently has to have it done over again.

BUT the question of competent workmen goes further and invades the body washing field. The tourist has to stop at scores of places where the garageman does not know how a well-finished car should be washed. Not only do they not know how it should be done, but they do not understand the elements of removing mud or dry dirt and the owner must pay the price of a finish being spoiled by incompetent workmen.

ALL of these and many other expenses that are charged up against the car owner are due to ignorance. The question is, what is the solution of the problem? A national garage association would help matters. Garages could be graduated according to their capacity and also the ability of their help. A method of apprenticeship could be instituted so that soon there would be developed a number of competent workmen. The tourist trade is going to increase in leaps and bounds during the next 5 years. Every new road that is opened will stimulate it. With increased travel there is the added necessity for increased ability in the garages. The matter is so important that something will have to be done to protect the tourist and see that he at least gets what he pays for. A railroad needs its competently-manned roundhouses at all divisional points. It could not operate without them. The motorist going from state to state and across the country must also have at his disposal not only garages where he can have his car well washed and cleaned, but also where he can be sure he is having his tires repaired and also where he can have good workmanship done on his car, no matter what make it may be. A national garage association would, if properly organized, be an excellent controlling force for such.

Slag for Roads

THE fact that European road builders are using slag successfully for road building is every reason why many of the central states, where road building material has to be hauled long distances, should not make some use of the tons of slag that are used to fill hollows and mud holes in not a few cities. Slag is a byproduct which in some cities is seen piled hill-high alongside of some of the most miserable roads that could be driven over. The foreigner discovered its suitability for road building through the engineers who are trained specially for road building, a department of engineering that some countries in Europe are very fond of. It would be a good investment for a few of our western colleges, in those states where road building is an unknown science, to at least add a short course in such studies so that when road engineers are graduated they will have some common-sense knowledge of what road building needs.

WE HAVE not a few so-called road engineers today who can survey a roadbed, but do not know how to add a little bank to a turn or give an application of road oil. These are practical problems that should be understood. They are too expensive to be constantly the subject of errors. There are perhaps a dozen or more states where efficiently trained engineers would have saved the state tens of thousands of dollars per annum. In these days of large road-building appropriations it is essential that the disposal of such funds be left to men who know. There has been too much indiscreet expenditure of road funds. Highways have been built that were entirely unsuited for the territory or the travel. Trained road engineers are needed. The only place such training can be secured is in our universities. There will be enough road engineers needed during the future to warrant some at least of our universities establishing departments for such education.

Nine Chicagoans Qualify for the Two Hundred Club

Two Candidates Earn Extra Honors on First Run

CHICAGO, July 21—The Two Hundred Club has been successfully launched and nine owners have qualified for the medals given by E. C. Patterson of Chicago for driving 200 miles in 10 hours without a motor stop. Making it still harder, the conditions call for each drive being made in the state from which the owner hails. Thirteen Chicagoans participated in the first formal attempt to qualify for the new club and of these nine were successful. The trip was a bold one, calling for a double-header or rather two attempts in as many days, the route being laid to Monmouth, Ill., and return, 205 miles each way.

Of the thirteen who made the attempt two of them earned extra distinction by making perfect scores each way—Charles S. Hatch, in a Stutz, and R. O. Evans, in an Apperson. For this each will have an extra spoke put in the wheel that constitutes the medal. Those who had to be content with the initial spoke were: W. E. Stalnaker, Premier; E. C. Patterson, Packard; H. E. Patterson, Warren; J. E. Callender, Edwards-Knight; P. E. Ennis, Marmon; Fred J. Robinson, Cadillac; G. Ross Stewart, Ford. The four who failed to go clean were: John W. Maguire, Moon; Burley B. Ayers, Cadillac, and David G. Joyce, Fiat.

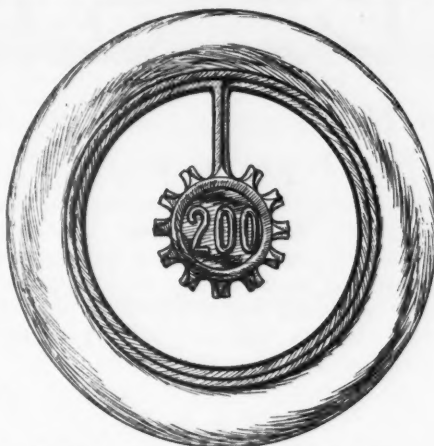
The Wolverines of Detroit propose to hold a similar run on August 3. Other trials for the Patterson medals will be held by others in the near future. The competition is not confined to any particular club or locality and those desirous of securing rules and other information should address E. C. Patterson, Westminster building, Chicago.

MILWAUKEE PAYING RACE CLAIMS

Milwaukee, Wis., July 21—It appears that creditors of the Milwaukee Automobile Dealers' Association, which conducted the grand prix, Vanderbilt, Pabst and Wisconsin motor trophy races at Milwaukee last October, will realize about 16 or 18 per cent on their claims, amounting to about \$38,500. Notice has just been issued by T. H. Spence, counsel for the M. A. D. A., that he is apportioning a fund pro rata.

"Please have clearly in mind that this is not the association making an offer of 'part payment' of its own debt," says Mr. Spence. "The association has nothing to do with this offer. The fund handed me is purely a voluntary contribution and you are in no wise urged to accept the offer here made. It is, however, in my judgment the only and last chance of creditors to secure something on their accounts against the association."

The list of contributors appended is as follows: F. J. Edwards, Emil Estberg, Curtis Auto Co., I. G. Hickman, August



Badge of Two Hundred Club. Each time an owner drives 200 miles in 10 hours without a motor stop a spoke is put in the wheel

A. Jonas, George P. Hewitt, George W. Brown, Smith-Hoppe Auto Co., American Auto Co., Schreiber-Boorse Motor Car Co., Edgar F. Sanger, H. W. Bonnell, M. J. Monson, E. B. Leverenz and H. Denischefsky.

RULES ON CHAUFFEUR DEFINITION

Buffalo, N. Y., July 21—Judge Harry L. Taylor reversed the judgment of conviction in the case of Wallace Allen, who was convicted by Judge Keeler in the city

court for violation of state highway law and fined \$50. Allen was charged specifically with operating a motor car as a chauffeur without a license. The case was in the nature of a test and was started to settle the question of whether or not the men employed on the motor hurry-up wagons of the telephone, telegraph and street railway companies must be licensed chauffeurs. Although Allen claimed that he was in no sense a chauffeur, but a foreman for the New York Telephone Co., here supplied with a motor car for quicker service in connection with his work in the decision undoubtedly will have important bearing on similar cases, and one of the results may be an amendment to the law, as suggested by Judge Taylor, so as to compel men engaged in operating motor cars to secure a license. Allen appealed the conviction. Judge Taylor rendered this decision:

"While the defendant was an employee of the corporation, I believe he was not a chauffeur-employee within the intentment of the statute; that is the driving of the motor vehicle was not a principal or substantial portion of defendant's employment. Perhaps there should be a statute covering this situation, but I think the existing one does not."

GALVESTON HAS GOOD ENTRY

Galveston, Tex., July 19—Twenty-one cars are entered in the beach races to be run at Galveston, Texas, July 28, 29, 30. Practice already has begun and daily hundreds of motor fans line the course to watch the tuning up sprints. The drivers already located on the course are for the most part amateurs of Texas and neighboring states who are to be pitted against the veteran pilots from the north. Ralph Mulford, who is to drive Mason entries, has left New York for Galveston, together with Joe Horan, who is to drive Otto Applegate's Lozier, as well as a Mercer entry. Armour Ferguson, with his new love, the Peugeot left New York on the steamship Lampasas. Louis Disbrow and his racing outfit of six cars will arrive on the course soon, while the Stutz and Studebaker entries are already on the course. Among the others listed to drive are Ralph de Palma, Joe Horan, Hughie Hughes, Harry Endicott, Harry Grant, Hugh Drane, Maco Stewart and August Behring.

The work of getting the beach into shape has been started. The course will be laid 15 miles westward from the Fort Crockett military reservation. Although a stretch of 30 miles of firm and hard-packed sand is available, Captain J. W. Munn, director of the meet, desires to keep the cars in view of the spectators most of the time, and for this reason only 15 miles of the course is to be used.

Coming Motor Events

CONTESTS.

July 1-August 12—French army trials.
 *July 26-31—San Antonio, Tex., tour.
 July 26—Orangeburg, N. Y., track meet.
 *July 28-30—Galveston, Tex., beach race.
 August 4—Grand Prix road race at Le Mans, France.
 August 9—Road races at Santa Monica, Cal.
 August 12—Kansas State Automobile Association endurance run to Colorado Springs.
 August 18-20—Fourth annual Wisconsin reliability tour.
 *August 29-30—Elgin road races, Chicago Automobile Club.
 August 30—September 6—Reliability run, Chicago Motor Club.
 September 9—Corona beach race, Cal.
 September 1—Track race, Columbus, O.
 September 8-15—Around Lake Michigan tour; Chicago Motor Club.
 September 12—Track meet, Canfield, O.
 September 13—Track race, Grand Rapids, Mich.
 *September 13—Track meet, Covington, Ky.
 September 20-21—Track meet, Detroit, Mich.
 September 21—French light-car road race, Boulogne.
 September 25—Tourist trophy stock-car road race, Isle of Man, Great Britain.
 October 4-11—Chicago Motor Club's Around Lake Michigan reliability.
 November 6—Track meet, Phoenix, Ariz.
 *November 24—Vanderbilt road race at Savannah, Ga.
 †November 27—Savannah grand prix.
 †Sanctioned by A. A. A.
 †Sanctioned by A. C. A.
 Shows
 October 17-27—Paris show.
 November 7-15—Olympia show.
 January 24—Chicago show.
 January 31-February 7—Minneapolis show.

Routes and Touring Information

What New Hampshire Is Doing for the Tourists

By James T. Sullivan

NEW HAMPSHIRE, long ago given the title of "the Switzerland of America," by reason of its splendid mountains and beautiful lakes, is more than ever a paradise for motorists because the present season will see finished the last stretch of the three big truck lines running north to south through the state.

Even now, with that accomplished, talk has been made of cross-country roads to connect the three lines, and plans for one already have been outlined. Certainly when one goes over the figures and facts no other state can point to a prouder record of achievement in the construction of highways than New Hampshire, for nearly all the good work has been finished since 1905, or within a period of 8 years. In looking back over the reasons for such splendid work one finds it is due primarily to the advent of the motor car. Coupled with that was the work of far-sighted hotel men who opened their arms to motorists and made them welcome instead of giving them a chilling reception. Such men were John D. Anderson and Joseph Price, both now dead, who knew more motorists than any other hotel men, perhaps, and who aided the motorists to put Bretton Woods on the map. Others

like William A. Barron, Mr. Mudgett, Mr. Greenleaf, W. S. Kenney and D. J. Trudeau have done their share to keep up this work, and the impetus given by the hotel men, who spent time and money improving the mountain highways, spurred on the state officials to do their share.

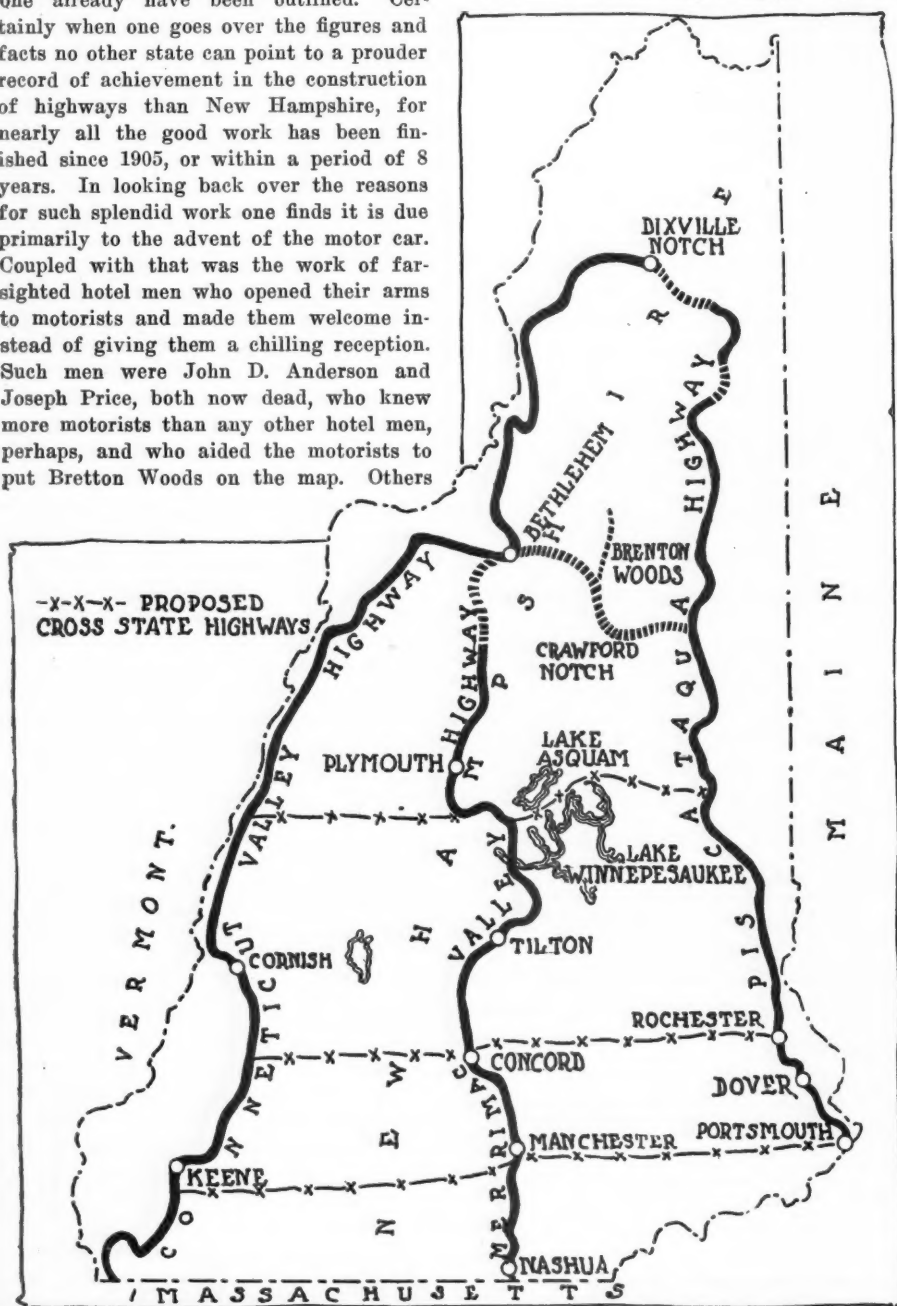
As a result while New Hampshire has about 16,000 miles of highways, and not more than 1800 are improved, yet there is

no section of the state that cannot be reached from another section by means of some fairly good roads. North and south the routes are easy, and the towns are doing more every year so the cross-country sections are being rapidly improved. Having mapped out and reconstructed nearly 800 miles of state highway at an expense of several million dollars, New Hampshire now proposes to look after its roads and so there are employed a number of road patrols who go over their allotted sections every day. Each patrol has a wagon and implements for making repairs, and so when a little rut or spot showing signs of breaking up is found, it is promptly mended thereby saving the state thousands in maintenance expense had the roads been allowed to disintegrate and become motor car pitfalls.

The first definite plan for state roads was outlined in 1905 when certain fixed sums were paid to towns for building roads within their borders provided they were stretches along main traveled highways. Nearly 70 per cent of the towns took advantage of this offer and road work was begun. The provision was made that the money was to be spent for road improvement, not maintenance. These roads were to be object lessons to stimulate the interest in good roads. It was found, however, that in some towns where there was a long mileage it was not feasible to construct the entire length, and so there were spots that were in very poor shape on otherwise good stretches.

It was 1907 then that saw the first real plan of trunk roads worked out on a logical basis. The legislature in that year decided that the state should be more liberal, and so it proposed to pay for half or more of the cost of construction of three main highways to run through the state. The plan seemed so feasible that the following legislature went ahead and mapped out the route of these highways. Meanwhile work was progressing upon them and each succeeding legislature has aided the good work along until today the plans of the earlier legislatures are nearly completed.

Those who toured to Bretton Woods in the Glidden tours in 1905, 1906 and later, and who attended the "Climb to the Clouds" may remember how narrow some of the stretches of roadway were, with very dangerous curves, not to mention the dangerous grades such as Crawford notch, where horses were on hand to help pull the cars over, etc., Franconia mountain, Cherry mountain, and other awe-inspiring



MAP SHOWING TOURING POSSIBILITIES OF NEW HAMPSHIRE

grades. They are all memories now, and if a motorist of those days were to tell his experiences today to the newer generation much of it would be doubted.

The three trunk highways in New Hampshire had natural courses to follow. On the east the Piscataqua river flows down to the sea from the vicinity of Dixville notch. On the west there is the famous Coneneticut river winding its way and forming a natural boundary between New Hampshire and Vermont. Between these two rushing rivers loom up the White mountains in the northern section, and then from the foothills of the mountains the well known Merrimac river forming a valley to the south.

In the center of the state are the two big lakes, Winnepesaukee, with its 365 islands, one for every day in the year, and Askum lake right above it. The mapping out of these trunk lines placed two at the outer edges of the state and one in the middle so the state was divided into two sections of about equal size. The eastern line goes down through to Portsmouth at the sea, touching the cities of Dover, Rochester and Somersworth and skirting the White mountains. It is possible to leave this route at Conway and enter Maine, going down through Poland Springs to Portland. This highway is 157.29 miles long and ideal for motoring.

The western road goes down through Keene to the Massachusetts line connecting with the Bay state highway through Springfield and the Connecticut road through Hartford. It is possible to shoot off from this route to either northern or southern Vermont, thereby going by the former to Montreal or the latter through the Berkshires to New York. This road totals just 210.97 miles, and is the longer of the three. The Merrimac valley route goes down through the mountains, or rather it is better to say extends north into the mountains. There are supplementary roads joining the east and west highways through the Conways, Maplewood, Bretton Woods, Bethlehem, Franconia, etc. The Merrimac valley highway is a direct one from Boston to the mountains going by way of Lowell, Nashua, Manchester, Concord, Plymouth, Franconia Notch, etc. It is shorter than the others, being 108.73 miles in length. Up in the north the east and west routes merge together so that one may go up by one route and down by either of the other two, giving a different aspect and change of scenery every few miles.

The trio of cross-country highways planned will not be difficult problems for the state highway department. Already a lot of the work has been done by the towns themselves, and with the state ready to help out it would be a matter of but a year or so before they would be finished. The first cross-country route that will be finished will be from Portsmouth at the east through Manchester to Keene. That already has been decided upon by

Blue Book—A. C. A. Suit Settled

NEW YORK, July 21—The suit for infringement of the copyright laws, brought by the Automobile Blue Book Publishing Co. against the Automobile Club of America, for infringement of the copyright in the publication of the tour book issued by the club, has been settled out of court. In the settlement the club makes a substantial cash payment to the Blue Book, and withdraws its contemplated road book from publication for this year. The club also indorsed the Blue Books by the purchase of 1,000 copies for distribution among its members.



the legislature just closed, an appropriation having been passed for a survey of it. The second cross-country highway will radiate through Concord, which is the capital of the state, and touch Rochester at the east, perhaps and past Lake Sunapee on the west, the third largest lake in the state. The third highway probably would stretch from about Hanover, the seat of Dartmouth college, on the west between Asquam and Winnepesaukee lakes and through to the Ossipees. With boulevards surrounding these two lakes, which are also proposed for the future, it will make New Hampshire a real motor paradise, for it has its ocean seashore frontage, real big mountains and large lakes.

New Hampshire now gets something like \$150,000 a year from the motorists for road maintenance, and much good has resulted from the wise expenditure of this sum. The law does not specify that the money must be all spent on the three main trunk lines, and so there has been built up with its aid for maintenance something like 200 miles of radiating roads that run off from the trunk highways, and these connect with many little towns and villages so picturesque that they are well worth a visit. The state has gone about the building and maintenance in a systematic manner, and the New Hampshire highway department went prospecting for road material which resulted in finding a lot of good gravel banks easily accessible for road construction.

In addition to the roads mentioned above there are many places where towns and cities have built roads that are in every way the equal of the state highways, though not a part of them. Jackson, Conway, Durham, Dublin and Milford have some fine stretches. Cornish, the summer home of President Wilson, also has some fine roads, and when it was announced that he was to spend the summer there the legislature appropriated \$12,000 to finish a stretch that was under contemplation for some time.

LEGAL TIP FOR TOURISTS

There now are two new motor laws on the Massachusetts statute books which have just been passed and all motorists visiting the Bay state this summer should

bear them in mind. As these laws probably will not be included in the usual motor law code visitors should not forget them when preparing for a tour through the state discovered by the Pilgrims.

While one of them specifies non-resident motorists particularly both laws apply equally to them. In the past non-resident drivers and owners were not subject to the general law for revoking licenses like the Massachusetts motorists, so the vigilant chairman of the highway commission decided to put them under the commission's power and there was presented to the legislature a law that has just been passed that says:

The commission, under the same conditions and for the same causes for which it may suspend or revoke any license issued by it, may also suspend the right of any non-resident of Massachusetts to operate motor vehicles in this state until such person shall have received a license from said commission; and the provisions of section 21 of said chapter 534 shall apply to any such person who operates a motor vehicle in this state after notice of such suspension has been issued and received by said operator, or by his agent or employer.

Section 21 referred to above calls for a fine of not more than \$100 and imprisonment for 10 days, or both such fine and imprisonment for operating a motor car in violation of the above law. So chauffeurs who come from other states will have to be careful. While it has not been announced yet, still it is understood that the drivers who go there for the summer with wealthy residents who have places along the north shore are going to be watched carefully this summer and a number of them undoubtedly will fall victims to this law, particularly if the 25-mile-an hour law goes into effect.

The other law refers to all motorists, and so visitors may come prepared to observe it. This one refers to accidents and was put in by the Highway Safety League. As some of the visiting motorists may figure in some mixup or other while they are touring in Massachusetts they may as well know that they must play the part of policemen and report themselves to the highway commission under pain of losing their licenses. As the commission will insist on the law being observed, licenses will be suspended for failure to comply with this law, which in effect will serve to make the commission aid others to recover from motorists in damage suits by having records available to the public. Here is the law:

Section 1—Every operator of a motor vehicle which for any reason is involved in an accident in which any person or property is injured shall forthwith report the same to the Massachusetts highway commission.

Section 2—For any violation of the provisions of this act said commission may revoke or suspend the license of the operator.

That law went into effect May 22, and as many motorists may not know anything about it they will learn also the familiar phrase "ignorance of the law is no excuse." And next year following the obedient rule of Massachusetts other states will undoubtedly put this same law on its statute books.

The observance of these statutes should in no way inconvenience the visiting motorist and are for his protection.

Answers to Route Inquiries from Motor Age Readers

Birmingham, Ala.-Chicago

BIRMINGHAM, Ala.—Editor Motor Age—Kindly give us the best touring route from Birmingham, Ala., to Chicago. Is it necessary or advisable to purchase a Blue Book; if so, which volume?—C. W. Cornell, Jr.

On your trip to Chicago you will find fairly good roads the greater part of the way, the only really bad stretches being between Nashville and Louisville, although we have received authentic information within the last few months that at least considerable improvement is being effected on this route, especially along the rougher stretches.

Birmingham to Decatur 95 m., via Hanceville, Coleman and Leadsdale; Decatur to Nashville 105 m., via Pulaski and Columbia; Nashville to Mammoth Cave 112 m., via Gallatin, Scottsville, Glasgow and Cave City; Mammoth Cave to Louisville via Hardeeville, Buffalo and Bardstown.

On account of the rather poor condition of the road from Louisville to Seymour the longer but better route to Indianapolis via Paoli is recommended; 48 m. to Paoli via New Albany-Vincennes turnpike; Paoli to Indianapolis 110 m., via Bedford, Bloomington and Martinsville; Indianapolis to Lafayette 66 m., via Royaltan, Lebanon and Frankfort; Lafayette to Chicago 130 m., via Walcott, Remington, Rensselaer, Thayer, Crown Point and East Chicago.

Complete detailed running directions are given on this route and also many optional routes in volumes 3 and 4 of the Blue Book. We feel safe in stating that the use of such a route guide will save you a great deal of time on your trip. Each volume is \$2.50 and procurable from the Automobile Blue Book Publishing Company, Karpen Building, Chicago.

Yorkville, Ill.-Maquoketa, Ia.

Yorkville, Ill.—Editor Motor Age—Kindly publish the route from Yorkville, Ill., through Madison, Wis., to the Dells; then to Maquoketa, Ia., and back to Yorkville, Ill. State condition of roads.—G. D. Ament.

From Yorkville go to Aurora and from there to Lake Geneva 67 m., via Geneva, Elgin, Algonquin, Crystal Lake, Ridgefield and Hebron. From Lake Geneva to Madison there are two or three ways, but the most traveled is via Delavan, Janesville, Edgerton and Stoughton; Madison to Kilbourn 56 m., via Sauk City, Baraboo and Delton.

On your return trip would recommend your coming back to Madison unless you wish to go clear to LaCrosse, which would be much longer and through quite hilly country; from Madison go to Dubuque 103 m., via Pine Bluff, Dodgeville, Calamine and Plattville; Dubuque to Clinton 72 m., via Maquoketa; from Clinton go almost straight east over the Illinois division of the Transcontinental route to Geneva 109 m., via Sterling, Dixon, Rochelle and DeKalb; from Geneva to Yorkville via Aurora.

The selection of this route assures you the maximum comfort on such a tour, as the roads are in good condition because of good roads activities this year.

Collinsville, Okla.-Seattle, Wash.

Collinsville, Okla.—Editor Motor Age—Kindly advise where information can be obtained of the best routing from Collinsville, Okla., to Seattle Wash., via Denver.—J. D. Ward.

Would advise your coming almost straight north from Collinsville through Bartlesville to Caney, Kans.; here turn west to Winfield, passing through Peru, Sedan and Dexter. From Winfield you will find a good road to Wichita 82 m., passing through Mulvane and Derby; Wichita to Hutchinson is 59 m., via Colwich, Mt. Hope and Haven. At Hutchinson you pick up the new Santa Fe trail, going to Dodge City 155 m., through Sterling, Lyons, Great Bend and Knisely; Dodge City to Syracuse 107 m., via Charleston, Garden City and Lakin; Syracuse to LaJunta 115 m., via State Line, Lamar and Las Animas; LaJunta to Pueblo 65 m., via Rocky Ford, Elder and Avondale.

For distances in towns passed through on your trip from Pueblo to Ogden see July 3rd issue of Motor Age, page 23.

From Ogden to Seattle the natural route would be to go north to Pocatello 135 m., passing through Brigham City, Deweyville, Cherry Creek and Portneuf; from Pocatello go west and north through American Falls, Twin Falls, Bliss and Mountain Home to Boise, and from there continue northwest through Caldwell, Weiser, Baker City and Legrand to Walla Walla and from this latter city through Wallula, Prosser, North Yakima, Ellensburg, Cle Elum into Seattle.

This route particularly beyond Pocatello, although feasible, has only been made by a few cars and we cannot recommend it for tourist purposes. The distances between both hotel and garage accommodations are long and you should carry complete camping outfit. For the most part the roads are nothing more than trails and you will have everything from sand and rocky roads to steepest of climbs and mountains.

By far a better and safer route is to go west from Ogden on the regular Transcontinental route to Kelton 108 m., via Brigham City, Deweyville and Blue Springs; Kelton to Cobre 90 m., via Terrace, and Tecoma; Cobre to Elko 94 m., via Wells and Dieth; Elko to Eureka 106 m., passing through no towns to speak of, although passing many ranches; Eureka to Austin 70 m.; Austin to Reno 183 m., via Eastgate, Sand Springs, Fallon, Leetville and Wadsworth. From Reno to Sacramento 153 m., you can go around the north end of Lake Tahoe through Truckee, Alta, Colfax, Auburn and Folsom, although you will find the slightly longer route around the south end of Lake Tahoe more picturesque and well worth the trip. This passes through Carson City, Myers, Placerville and Clarksburg.

At Sacramento you turn north on the Pacific Coast highway.

Winchester, Ill.-Webb City, Mo.

Winchester, Ill.—Editor Motor Age—Am planning a motor trip to Webb City, Mo., and would like to know the best route and the condition of roads.—Wilson Coultais.

Go west from Winchester to Louisiana 40 m., via Bloomfield, Florence and Pittsfield; from Louisiana go direct to Mexico, Mo. 60 m., via Bowling Green, Curryville, Vandalia and Laddonia; Mexico to Marshall 100 m., via Clark, Rennick, Moberly, Armstrong, Glasgow and Slater; Marshall to Kansas City 90 m., via Malta Bend, Lexington and Independence.

From Kansas City go almost straight south to Webb City 180 m., passing through Delton, Harrisonville, Adrian, Horton, Nevada, Sheldon, Jasper and Carthage.

You should have no difficulty in matter of road conditions, particularly as far as Kansas City, with the exception of crossing the Illinois river just east of Pittsfield, with which you are probably very familiar. A great deal of improvement is going on all along the route across Missouri and there is considerable travel on the Kansas City-Joplin route, and although it is not likely to be quite as good as the rest you should have no difficulty.

Golden City, Mo.-Phoenix, Ariz.

Golden City, Mo.—Editor Motor Age—I am planning a trip to Phoenix, Ariz., and would like best route and northern one.—Frank Acru.

Motor Age has not been able to collect complete information on a direct route from your section across southeast Kansas to Wichita, but from our general knowledge of that section we believe you can be assured of very good natural roads by going on almost a direct line to Wichita, Kans., via Pittsburg, Erie, Chanute, Benedict, Severy, Beaumont and Augusta.

From Wichita your surest road is to go to Hutchinson 59 m., via Mount Hope and Haven; at Hutchinson you meet the new Santa Fe trail and follow same through Lyons, Great Bend and Kinsley to Dodge City, 159 m. From there to Syracuse 107 m., via Garden City, and Lakin; Syracuse to La Junta 115 m., via Grenada and Las Animas.

There is a direct line from La Junta to Trinidad 91 m., but you will find better roads by continuing west 65 m. to Pueblo and then south to Trinidad 90 m.; from Trinidad go to Las Vegas 141 m., via Raton; Las Vegas to Santa Fe 75 m.; Santa Fe to Albuquerque 67 m.; Albuquerque to Springerville 275 m., via Secora, and Magdalena; Springerville to Globe 148 m.; Globe to Phoenix 15 m.

Complete detailed running directions are given for this route in Blue Book volume 5 from Wichita to Phoenix.

Omaha, Neb.-Brainerd, Minn.

Nebraska City, Neb.—Editor Motor Age—Please give me route and distances from Omaha to Brainerd, Minn.; also information as to road conditions.—Edwin Zimmerer.

Would suggest on this trip your first objective point be Minneapolis, for although it may seem like going a little bit out of your way it will pay you to follow main lines of motor car travel. Although it is possible to go up to Sioux City and Sioux Falls and from there to Minneapolis, you will probably find it a little shorter and make better time to go from Omaha to

Grand Junction, Ia., 144 m., via Missouri Valley, Denison, Carroll, Scranton and Jefferson. This is along the regular line of the Iowa Transcontinental route; from Grand Junction go north to Ft. Dodge 39 m., via Paton and Gowrie; Ft. Dodge to Mankato 133 m., via Humboldt, Algona, Burt, Bancroft, Ledyard, Blue Earth, Winnebago and Garden City; Mankato to Minneapolis 80 m., via St. Peter, Lesueur, Jordan and Shokopee; Minneapolis to St. Cloud 66 m., via Oseo, Anoka, Elk River and Cable. This latter route follows very closely the Mississippi on the north side all the way from Anoka.

We are not quite so sure about road conditions from St. Cloud to Brainerd; although you may strike some sand, the trip is being made right along and you should not encounter any difficulty. It's about 70 miles to Brainerd on the east side of the river all the way through Watah, Royalton, Little Falls and Ft. Ripley.

Quincy, Ill.-Pacific Coast

Quincy, Ill.—Editor Motor Age—We are planning a trip to the Pacific coast by way of Denver. Which would you suggest as the best route by way of Keokuk to Denver—the shortest route, by way of Centerville, Shenandoah, Ia., Nebraska City, McCook, Sterling, or the Northern or Overland trail by way of Omaha, Columbus, Lexington, Julesburg? If you suggest the latter please give best route from Keokuk to Omaha. We prefer the best route rather than the shortest one.—George F. Wissmann.

As you state, your shortest route west from Keokuk is to follow the Waubesa trail, and although this is quite a hilly route, we understand that it has been kept up in fairly good shape. Of course, if you come north to Fort Madison, you strike the Blue Grass trail that leads west through Ottumwa, Albia, Osceola, Crescent and Rft Oak. We hardly believe, however, that it would give you so much better road conditions. If you follow the Waubesa trail to Nebraska City and Lincoln, as you suggest, you can either continue on the Omaha-Denver route through Hastings and McCook or you can go direct to Grand Island via York, 99 m. from Lincoln; from Grand Island you can follow the Overland trail west to San Francisco, complete mileages and towns passed through being given in Motor Age issue of July 3. This would not necessarily take you into Denver; if you go into Denver you will probably find it most convenient to continue on the Omaha-Denver route and then go north from Denver to Laramie or Cheyenne, where you would meet the Overland trail.

Of course, you could map out an entirely different route by going south to Quincy and Hannibal and from there to Mexico and then across Missouri to Kansas City, where you could follow the new Santa Fe trail or Golden Belt route to Colorado Springs or Pueblo, respectively. You will find information on both of these routes in the issue of Motor Age mentioned above.

Shreveport, La.-Chicago, Ill.

Shreveport, La.—Editor Motor Age—I would like the best route from Shreveport to Chicago, as I am not familiar with the western dirt roads. No doubt you have guide books and charts of all the good roads and routes, and we would thank you very much for the above information.—J. W. Atkins.

Your shortest route to Chicago would be to come up to Texarkana. We understand the best going is now following west side of the river. From Texarkana go to Hot Springs 138 m., then to Little Rock and Forrest, up the Little Rock-St. Louis highway through Jonesboro and Cape Girardeau. This route, however, although the shortest, is not recommended on account of the general poor condition of the roads practically all the way to St. Louis.

Nearly all people from your section find it best to come straight west to Dallas 220 m., via Marshall, Big Sandy, Minneola and Terrell; from Dallas to Fort Worth 32 m.; Fort Worth to Wichita Falls 124 m., via Decatur, Bowie and Henrietta; Wichita Falls to Lawton 60 m., via Burke Burnett Lawton to El Reno 113 m., via Apache and Pocossett; El Reno to Wichita, Kans., 184 m., via Enid, Caldwell and Wellington; from Wichita to north 24 m. to Newton, where you meet the new Santa Fe trail; turn east on same for Emporia 83 m.

From Emporia you will find good going to Topeka through Osage City 75 m.; Topeka to Hiawatha 70 m.; Hiawatha to St. Joseph, Mo., 42 m.; St. Joseph to Des Moines, Ia., 193 m., via Stanbury, Grant City, Mount Ayr; Des Moines to Davenport 187 m., via Colfax, Newton and Iowa City; Davenport to Chicago 173 m., via Sterling, Dixon and Rochelle.

Bay State Expert Tells of World's Road Congress Work

BOSTON, Mass., July 19—Colonel William D. Sohier, chairman of the Massachusetts highway commission, has returned from London, where he went as a delegate to the international good roads congress. Following the convention, he traveled some 2,000 miles over the roads of France and Great Britain in his motor car and made a thorough first-hand inspection of what was being done across the water to improve highways. He has collected a lot of data and some of it he will submit to the good roads congress to be held in Detroit in September. From what he saw on the other side he was able to make comparisons with work being done here. The maintenance problem has not been solved by European experts, and traffic conditions are as bad over there as they are in this country, he believes.

Foreign Road Conditions

"Generally speaking, the roads of Great Britain and France are no better than the best built roads in this country," said Colonel Sohier. "But over there they have practically no poor roads, for all the highways, whether national, district or local, are far superior to our country highways. Nearly every road is of macadam, gravel being very little used. This enormous mileage of good roads is due to the fact that they have been building highways over there for centuries, while good road building in this country began but a few years ago, comparatively speaking. In maintenance England and France are ahead of the United States, not in methods, but because they spend full three times as much money per mile and their labor is cheaper.

"The great road and motor vehicle problem abroad at the present time is the maintenance of a highway to withstand the exceedingly heavy traffic of freight-carrying vehicles. All the larger cities of England, but more especially London, have their streets filled with heavy motor buses carrying twenty-five or more persons, and in the streets and the outlying roads there are great numbers of steam lorries. These lorries carry about 5 tons each and usually have two trailers, each carrying a 5-ton load. They have iron tires, the rubber tired truck, which is common in American cities, being little in evidence.

"The heavy buses and lorries are breaking down the roads that have in the past withstood the lighter motor traffic successfully, even a 6-inch concrete base failing in London under loads from 12 to 30 tons. Massachusetts does not yet have to contend with this sort of traffic, but the increase in the use of motor trucks means that measures of a preventive nature will have to be taken to protect the highways, for trailers are coming into more general use. The states that already have taken steps to check the excessive loads

are moving in the right direction. The lorries carry on an inter-city traffic and they run out about 20 miles, while the buses go out about 18 miles. It would be easy to duplicate such conditions here.

"In Paris it is practically recognized that macadam is not strong enough to withstand heavy traffic. The Bois de Bologne is full of pot holes, where there is a macadam surface, as some of the much used roads around Boston. Paris is adopting wooden blocks for city streets, placing them on a concrete base, and for 10 miles out of the city in almost every direction there are such pavements which appear to be wearing very well. In London, also, this sort of pavement is now being used, with a tar surface over it, and it has not worn to any considerable extent."

The French system of road maintenance, that is often cited here as being a thoroughly reliable one, and an example for this country, and which New Hampshire has just adopted, that of having road patrolmen patching small holes continually from piles of rock along the way, seems to have failed. Colonel Sohier says he noticed that the patrolmen were engaged in cutting the grass and cleaning the gutters, but that where surface work was in progress it was being done with gangs of men with a steam roller, as has been the custom in this country for a long time. The French national roads have a 24-foot surface, 5 feet of grass, and 3 feet of gutter on each side. The district roads have 18 feet surface and the country roads of minor character 15 feet surface. State roads in Massachusetts are 15 and 18-foot surface. There is no building of new roads in France going on now and the whole country has been built up with highways that criss-cross the nation.

England has tried an interesting experiment that seems to be working well in surfacing roads with iron slag instead of stone. This slag, about the same size as 2½-inch stone, is prepared with a coating of tar before being applied and then rolled down. It packs well and then makes a smooth, durable surface. The slag comes from the iron centers and as there are great quantities of it available in certain parts of the United States the experiment in England is likely to be valuable to those states where it may be had cheaply.

Use of Tar on Roads

All through England and France the road builders are using tar almost exclusively on the road surface. Where a stone top is used the stones are generally of a good size and packed with tar. The English tar seems to keep its life better than that in this country, some pieces of road that Colonel Sohier saw having been down from 5 to 10 years. It is generally recognized that the tar must be covered. Sand sometimes heated, is being used, likewise the stone chips as used in some states in

this country. England has about 40,000 miles of tarred roads and about 4,000 miles of tar macadam.

Colonel Sohier cites as an example of what is being done in England in road maintenance the case of Lancashire, where a man named Schofield has charge of 623 miles of highways, main roads, too, and has available for maintenance and reconstruction \$1,500 per mile per year. Massachusetts, as an average state, spends about \$500 per mile per year. In Liverpool they have an interesting method of handling street work. The man who is at the head of the street department has complete charge of everything in, over and under the streets. If street car rails are to be laid he does the work. If a pipe is to be repaired or relaid he digs the trench, makes the repairs and replaces the surface. The same method prevails as to wires. In this way the streets are not continually being dug up for varied purposes and the surface is kept in good condition. There is in England one piece of Belgian block pavement on a concrete base put down 41 years ago and numerous pieces more than 30 years old that are in good condition. In Paris the streets are practically never dug up. The sewers are maintained from inside and carry no other pipes except those for water which are beneath the sidewalks.

Easy Grades in France

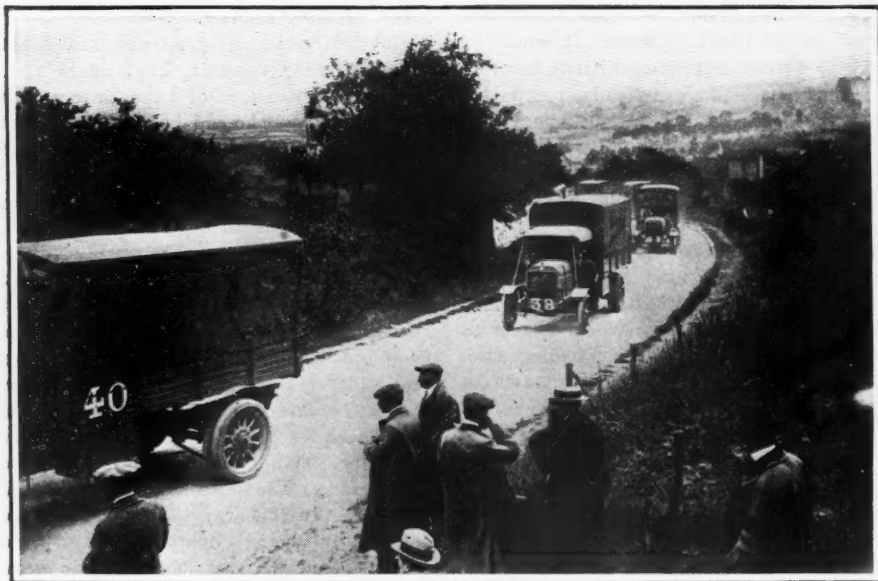
In France much attention has been given to easy grades and to wide corners, but in England some of the corners are very sharp and blind. Work is in progress, however, in England toward eliminating these dangerous spots. There is a 20-mile speed limit all over England for motor vehicles and it is very generally complied with, the punishment for violators being severe. A chauffeur may be fined as high as \$75 for a first offense and \$100 for a second offense.

Throughout the United States where roads are being improved there is felt the dearth of trained road engineers; they are very few and the schools do not seem to be turning them out. France, on the other hand, recognizes road building as practically a separate profession. To be an engineer in France a young man has to spend 7 years in study before he is even eligible to take an under position about like that of a road supervisor here, and then he must spend at least 2 or 3 years on the road in actual work before he may get his degree as engineer. This makes him both a practical and a technical man, for he must continue his studies while at work and pass an examination before he is promoted. Every administrator of highways in France and England generally speaking is a trained engineer.

In the matter of motor car accidents, they do not seem to be handling them any better, perhaps not as well as here.

French Military Authorities Try Out Motor Trucks

Facts About Vehicles in Strenuous Army Tests



TYPICAL SCENE IN FRENCH ARMY TESTS

FRANCE is in the midst of its annual military motor truck competition, the most important commercial vehicle competition of its kind in France, and probably in Europe. The primary object of the competition is to prove what models are suitable for army subsidies.

Seventeen manufacturers have entered seventy vehicles, representing thirty-five distinct models, and these are to be tested on the road for a full month, covering a total distance of about 2,500 miles. They have all essential parts sealed, fuel and lubricating oils are controlled, and at the end of the road test there is to be a thorough examination, some of the machines being entirely dismantled. Those machines having fulfilled all the requirements of the competition, particularly as regards average speed, reliability, economy, and endurance, are accepted as army types and can be sold with the advantage of the army subsidies, equaling \$520 at purchase and \$240 upkeep allowance for each of the 4 years the vehicle is in operation. This subsidy applies to a truck carrying a useful load of 3 tons. To assure absolutely stock vehicles being entered, the army authorities visit the factories and stamp the various parts at an early stage of manufacturing.

First Trials in 1897

These trials date back to 1897, when they were organized by the Automobile Club of France. In 1909 the military authorities took them over and inaugurated the present subsidy scheme. Their popularity is shown by the fact that in 1909 there were fifty-four competitors; twenty-eight in 1910; forty-eight in 1911; sixty-two last year, and seventy in the present competition.

By W. F. Bradley

Quite apart from the subsidy scheme, the trials are of value as a demonstration of the value of modern trucks, and as a high water test in which prospective purchasers have the fullest confidence.

Army Strictly Impartial

The army has no preferences; it has plenty of time, money, and men, to carry out most exacting and carefully conducted tests, and the public thoroughly realizes that if a truck has received the stamp of approval of the French army it can be relied on for commercial work. The trials are closely watched by commercial vehicle users, increased business invariably following the trials, although the purchasers may not be particularly interested in securing the subsidy. So thoroughly is the work done by the army that there is no room for any club or privately-organized competition.

The main features of the trials remain as last year. Trucks carrying a useful load of 2 to 3 tons are admitted. In the past it has been the practice for 3-ton trucks to carry a useful load of 3½ or

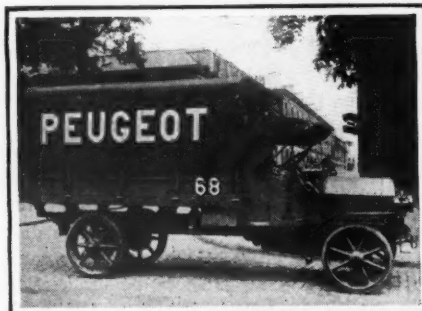
3¾ tons, an increased subsidy being granted for the extra amount. This year no extra subsidy is given for amounts over 3 tons. The change has met with dissatisfaction, for it is felt that if a truck is capable of carrying an overload with safety—the dead weight remaining within fixed limits—the manufacturer ought to have the advantage of that extra load. Vehicles taking more than a 3-ton load must go in the tractor class, in which the tractor can carry 3 tons and the remaining load be aboard one or two trailers. A third class is for four-wheel drive vehicles with trailers. This is an entirely new class and is one that will be encouraged by the French war department. Next year there will be a special competition for this class of vehicle, and this year's class can be considered as a preliminary. It is felt that for army work, and particularly for hauling heavy artillery and for taking ammunition and supplies right to the fighting line, a four-wheel-drive vehicle has decided advantages over the ordinary type.

All competitors in these trials must be able to run on gasoline, benzol and alcohol without change of carbureter. This is done to guard against any possible shortage of fuel in time of war. Average speed on long journeys has been increased from 7.4 to 9.3 miles an hour. This is really an attempt to get rid of trucks shod with steel tires. It is not the policy of the French army to dictate to manufacturers how trucks shall be built, but to accept all vehicles which have shown a certain standard of efficiency in the practical tests.

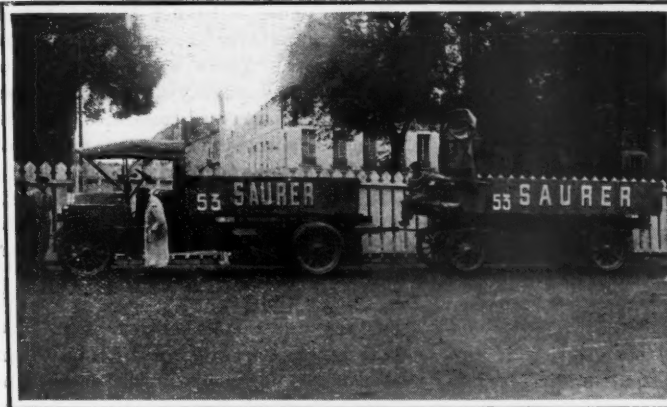
Increasing Average Speed

As trucks with steel tires have not been as successful in actual work as was expected, the competition has been made more severe by increasing average speed. If the trucks stand up under these conditions they will be accepted; if not they will have to go out. As a consequence of this increase in the speed average most manufacturers have preferred to withdraw their steel-shod models. The only exceptions are Aries, with one type having steel bandages and the front-drive Latil. This latter is an exceptional case, for the whole of the mechanism is over the front wheels, which are shod with double rubber tires.

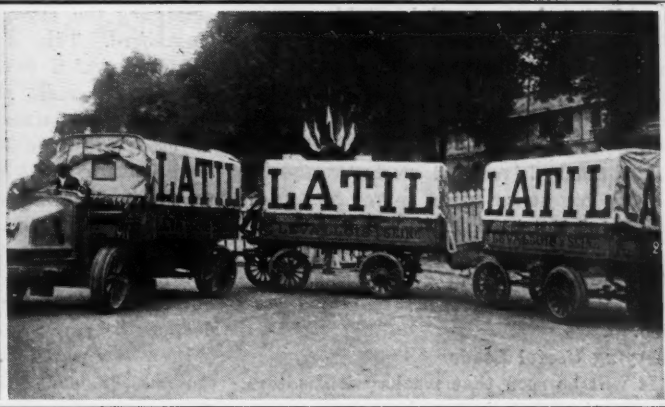
The advantage which steel tires enjoyed has dwindled away by reason of improvements in rubber tires and the consequent lower cost of upkeep. Two or 3 years ago a tire guarantee of 6,000 miles, with restrictions as to speed and weight, was rather difficult to obtain, and in practice the life of a solid rubber tire was not much more than 5,000 miles. At the present time the French army trucks show



PEUGEOT'S MOTOR TRUCK



SAURER TRACTOR AND TRAILER



LATIL'S MOTOR TRAIN

over 20,000 miles with standard sizes of solid rubber tires, and the Paris General Omnibus Co. is being able to get 30,000 miles from tires before they are scrapped. With these improvements rubber-shod trucks have an upkeep cost as low if not lower than that of steel-shod vehicles, while the possibility of breakage through vibration is decidedly decreased. All tires are of continuous band type. Block rubber tires are not used.

Correct Suspension Necessary

Correct suspension plays an important role in the life of tires and mechanism. Where steel tires are still used the greatest care is taken with suspension. The Latil 3-ton truck with steel tires at the rear, has long semi-elliptic springs at the rear with a width of $5\frac{1}{2}$ inches. The face width of the steel tires is 6 inches. This machine carries nothing over the rear axle, the motor being in front and the front wheels being both drivers and steerers. The Latil has a special type of coil spring shackle which must contribute in no small degree to easy suspension. The shackle pin is received in the two

arms of a yoke having a stem carrying a stout coil spring, the spring and stem being contained within a hanger on the frame member. The tension of the spring can be adjusted and means are provided for maintaining a quantity of lubricant in the housing.

Aries, with the only other type of vehicle using steel bandages, makes use of two sets of springs. The main springs, seated under the dead axle—the truck is a chain-driven model—have eight leaves of 4 inches width; the auxiliary springs mounted above the axle have five leaves and the same width. The auxiliary springs are not shackled. They are brought into play when a load is being carried; when running light the main springs only are in operation. The steel bandages on the Aries have diagonally placed frows of hollows on their circumference with a view to preventing skidding. One of the objections made against steel-shod trucks is their inability to operate on greasy granite paved roads and in snow.

Renault, with a tractor carrying a useful load of 5,700 pounds, and having 4 tons useful load on two trailers, total weight of the tractor being 16,000 pounds, uses semi-elliptical springs at the rear of his tractor with a width of $5\frac{3}{8}$ inches. The front springs of the same vehicle measure $3\frac{1}{4}$ inches across, and the practically flat springs of the trailers also measure $3\frac{1}{4}$ inches. The wheels of the trailers are shod with steel bandages.

Huge Tires Used

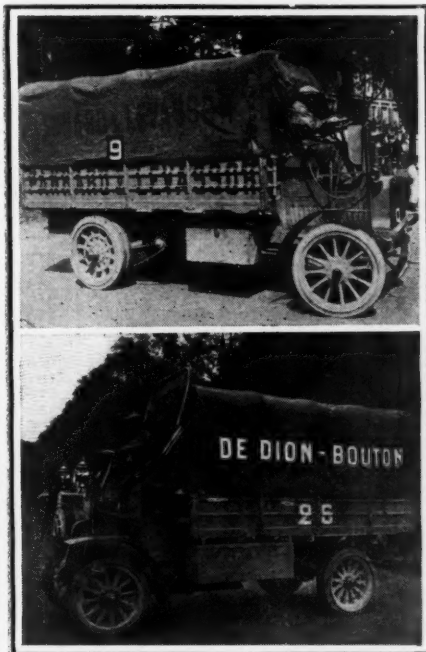
On the Balachowsky & Caire gasoline-electric trucks weighing 13,000 pounds, of which 6,100 pounds is useful load, the rear tire width is $4\frac{1}{2}$ inches. Although having rubber tires front and rear, these trucks have the entire power plant mounted on a coil-spring suspended sub-frame. Dietrich, with a useful load of 6,600 pounds and total weight of 14,000 pounds, used springs with eleven leaves and 3 inches width. This may be taken as quite standard practice.

The great majority of the wheels are of wood, the number of spokes being fourteen for the rear and twelve for the front. Latil, Balachowsky & Caire and Peugeot are using cast steel wheels and Bayard-

Clement is employing steel disk wheels. All the metal wheels are shod with rubber tires. On one of the Latils the combination is steel wheels with rubber in front and wood wheels with steel bandages in the rear. There are indications that the cast steel wheel will become more popular. In the past trials there has been a certain amount of trouble with wood wheels owing to shrinkages as the result of variations in temperature. This year's wood wheels appear to be better built and much more likely to give satisfactory service than any of those used in earlier trials.

Studying Fuel Economy

Manufacturers are encouraged to study fuel economy in the army trials. Most careful control is kept of the fuel used, the distance covered, and loads carried. The data under this heading is most valuable, but unfortunately will not be published until about 6 months after the trials. The engine sizes and weights with and without load have already been given out. These are of value by reason of the extreme accuracy with which they are



PANHARD AND DE DION TRUCKS



LORRAINE-DEITRICH AND RENAULT

compiled. In the adjoining table will be found the motor size,—bore and stroke in inches—its horsepower under the S. A. E. formula, the weight empty, the useful load, and the total weight. By weight empty is understood the truck with all tanks filled, driver and mechanic aboard, a very big selection of spares and tools and a platform body with tarpaulin top having hoops of sufficient strength for stretchers to be attached to them. The useful load is thus the actual load carried.

Carrying Useful Loads

It will be seen that trucks with motors of practically 4 inches bore—accurately 3.9 inches—are carrying useful loads varying from 7,700 pounds to 5,900 pounds. It should be noted too, that there is no encouragement to overload; no extra subsidy is secured by taking a load of more than 3 tons on any one vehicle. In addition to carrying these loads every vehicle must be capable of hauling another vehicle of equal weight over a dry macadam surfaced road having a gradient of 6 per cent. All vehicles must be capable of climbing gradients of 12 per cent, and have motors of sufficient flexibility to travel in convoy formation with and without load. Although the average speed is 9.3 miles an hour, it is forbidden, under any circumstances, to exceed 16 miles an hour.

Gasoline, alcohol and benzol are the three fuels imposed in the competition. They must be used without a change of carbureter and with no other adjustments than can be made on the roadside. A few of the vehicles make use of all three fuels with no changes in the carbureter, merely

adjusting the extra air control from the dashboard. This is done by the Renault vehicles, which have a control whereby they can increase the quantities of cold and hot air. In most cases a smaller jet is used with the change from gasoline to benzol, a small washer is put on the carbureter float to weigh it down and a little more hot air is given. For alcohol the same adjustment is maintained, with a still greater increase in the supply of hot air, the cold air being proportionally decreased.

In a few cases the compression is increased for benzol by putting in deeper valve caps. This, however, is not general, the majority of the competitors making no change in the amount of compression. No definite rules can be given for these carbureter adjustments, each motor calling for slightly different treatment. The above is the general plan adopted.

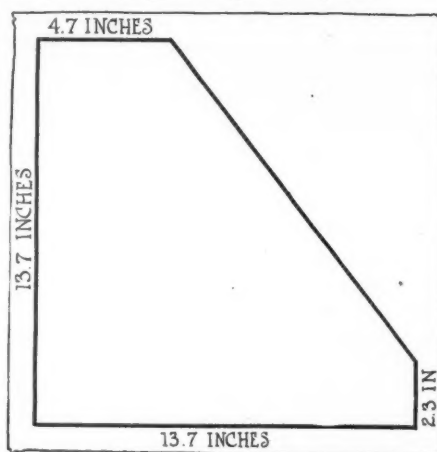


FIG. 1—BLOCK TO DETERMINE CLEARANCE

Motors under a bonnet have a numerical advantage over those with under the feet location. There are forty-eight of the former and twenty-six of the latter. So far as the army is concerned no preference is shown, the military regulation only calling for a determined body space. Chain-drive is in the majority, with shaft and bevel gearing second and worm gearing found on two types only, a Peugeot and a La Buire.

Four-Speeds Obligatory

For the first time this year four-speed gearboxes are an obligatory fitting. Clearance must be 13.7 inches. The method of determining this is to pass a block of wood having the shape and dimensions, shown in the illustration, Fig. 1, under the chassis, the lowest end, having a height of 2.3 inches, being placed close to the wheel.

Other obligatory features are towing hooks front and rear, a powerful sprag, hood for the driver, a permanent recording speedometer, and lockers with spares and supplies. In most cases these lockers are suspended below the overhanging portion of the body and alongside the frame members. On the de Dion-Boutons there are two of these lockers, the left-hand one being divided into compartments to receive the various parts and on the inside of the swinging lid there being an illustration of all the objects showing the manner in which they should be packed. The locker on the opposite side serves for spare oil, rags, and the parts most likely to be needed. It is necessary that a very complete supply of spares should be carried, the calculation being made on an active service basis with the truck altogether out of reach of its factory.

TABLE SHOWING HORSEPOWER, WEIGHT OF VEHICLE, USEFUL LOAD, AND TOTAL WEIGHT OF TRUCKS IN FRENCH ARMY TRIALS

		Horse-power	Bore and stroke	Weight empty	Useful load	Total weight			Horse-power	Bore and stroke	Weight empty	Useful load	Total weight
1	Delahaye	24	3.9x6.2	7,506	7,740	15,256	41	Berliet	24	3.9x5.5	7,716	6,183	13,899
2	Delahaye	24	3.9x6.2	7,693	7,782	15,475	42	Berliet	24	3.9x5.5	7,716	6,238	13,954
3	Delahaye	19.6	3.5x5.5	6,348	6,161	12,509	43	Berliet	19.6	3.5x5.5	7,186	5,246	12,432
4	Delahaye	19.6	3.5x5.5	6,304	6,139	12,443	44	Berliet	19.6	3.5x5.5	7,098	5,335	12,433
5	Delahaye	19.6	3.5x5.5	7,109	6,668	13,777	45	Motobloc	15.6	3.1x5.6	6,128	4,706	10,834
6	Delahaye	19.6	3.5x5.5	7,330	6,668	13,998	46	Motobloc	15.6	3.1x5.6	5,840	4,695	10,535
7	Delahaye	18.25	3.3x5.1	5,730	5,004	10,734	49	Saurer	30.6	4.3x5.5	6,789	5,103	11,892
8	Delahaye	18.25	3.3x5.1	5,763	4,993	10,756	50	Saurer	30.6	4.3x5.5	6,778	5,081	11,859
9	Panhard-Levassor	20.25	3.5x5.1	7,716	7,671	15,387	51	Saurer	30.6	4.3x5.5	7,583	6,657	14,240
10	Panhard-Levassor	20.25	3.5x5.1	7,671	7,572	15,243	52	Saurer	30.6	4.3x5.5	7,561	6,734	14,295
11	*Renault	30.6	4.3x6.2	10,273	5,698	15,971	53	*Saurer	30.6	4.3x5.5	9,380	6,678	16,059
12	*Renault	30.6	4.3x6.2	10,229	5,774	16,003	54	*Saurer	30.6	4.3x5.5	9,358	6,712	16,070
13	Latil front-drive	22.5	3.7x5.5	5,878	5,511	12,389	57	Brasier	18.25	3.3x5.5	7,341	5,588	12,929
14	Latil front-drive	22.5	3.7x5.5	6,922	5,511	12,433	58	Brasier	18.25	3.3x5.5	7,319	5,555	12,874
15	Latil front-drive	30.6	4.3x6.29	.....	.....	.....	59	Brasier	24	3.9x5.9	7,671	7,583	15,254
16	Latil front-drive	30.6	4.3x6.29	.....	.....	.....	60	Brasier	24	3.9x5.9	7,671	7,275	14,946
19	*Latil front-drive	30.6	4.3x6.29	10,030	5,555	15,585	65	La Buire	19.6	3.5x6.2	7,716	7,204	15,013
20	*Latil front-drive	30.6	4.3x6.29	9,975	5,533	15,508	66	La Buire	19.6	3.5x6.2	7,716	7,230	14,946
21	Balachowsky & Caire	25.6	3.9x5.9	7,638	6,106	13,744	67	Peugeot	19.6	3.5x5.9	7,230	5,081	12,311
22	Balachowsky & Caire	25.6	3.9x5.9	7,625	6,040	13,665	68	Peugeot	19.6	3.5x5.9	7,186	5,092	12,275
25	De Dion-Bouton	16.6	3.1x5.5	7,010	5,246	12,256	69	Peugeot	19.6	3.5x5.9	7,704	6,403	14,107
26	De Dion-Bouton	15.6	3.1x5.5	6,977	5,252	12,229	70	Peugeot	19.6	3.5x5.9	7,704	6,271	13,975
27	De Dion-Bouton	24	3.9x5.5	7,219	6,282	13,491	71	Peugeot	36.1	4.7x5.9	10,295	7,286	17,581
28	De Dion-Bouton	24	3.9x5.5	7,164	6,007	13,171	72	Peugeot	36.1	4.7x5.9	10,317	7,319	17,636
29	De Dion-Bouton	24	3.9x5.5	7,716	6,966	13,682	73	Clement-Bayard	19.6	3.5x5.5	7,689	6,176	13,865
30	De Dion-Bouton	24	3.9x5.5	7,716	6,966	13,682	74	Clement-Bayard	19.6	3.5x5.5	7,716	6,117	13,833
31	Rochet-Schneider	22.5	3.7x5.5	7,716	6,734	14,450	81	Lorraine-Dietrich	22.5	3.7x5.6	7,495	6,679	14,174
32	Rochet-Schneider	22.5	3.7x5.5	7,716	6,712	14,428	82	Lorraine-Dietrich	22.5	3.7x5.6	7,716	6,834	14,550
33	Delaugere-Clayette	24	3.9x5.5	7,087	6,183	13,270	85	Aries	14.4	2.9x5.5	5,952	4,420	10,372
34	Delaugere-Clayette	24	3.9x5.5	7,120	6,128	13,248	86	Aries	14.4	2.9x5.5	5,853	4,431	10,284
35	Delaugere-Clayette	24	3.9x5.5	7,660	7,815	15,475	87	Aries	19.6	3.5x5.9	7,716	6,635	14,351
36	Delaugere-Clayette	24	3.9x5.5	7,660	7,815	15,475	88	Aries	19.6	3.5x5.9	7,716	6,635	14,351
37	Berliet	24	3.9x5.5	7,693	5,952	13,645	89	Aries	25.6	4 x6.2	7,716	.....	.....
38	Berliet	24	3.9x5.5	7,682	5,963	13,645	90	Aries	25.6	4 x6.2	7,671	8,024	15,695
39	Berliet	24	3.9x5.5	7,716	7,506	15,222	97	Peugeot	19.6	3.5x5.9	7,627	6,635	14,262
40	Berliet	24	3.9x5.5	7,716	7,495	15,211	98	Peugeot	19.6	3.5x5.9	7,606	6,613	14,219

*These machines also haul trailers

Weight empty includes body with hood, driver and mechanic, all tanks filled, and full supply of spares

FEATURES OF MOTOR TRUCKS COMPETING IN ANNUAL FRENCH ARMY TRIALS

MAKE	Cylinders	Motor Location	Motor Speed	Carburetor	Cooling	Lubrication	Clutch	Speeds	Drive	Wheels	Tires	Tire Sizes	Useful Load	Overall Dimensions
DELAHAYE.....	Monobloc 3.9x6.2	Bonnet	1100	Delahaye	Pump	Gear Pump	Leather Cone	3.7, 6.8, 10.5, 17	Chains	Wood	Continental	36x4.7 40x5.1	7740 pounds	230 in. 78 in.
DELAHAYE.....	Monobloc 3.5x5.5	Bonnet	1100	Delahaye	Pump	Piston Pump	Leather Cone	4, 7.5, 12, 19	Chains	Wood	Rubber	36x4.3 40x4.7	6100 pounds	209 in. 74 in.
DELAHAYE.....	3.5x5.5	Under feet	1100	Delahaye	Pump	Gear Pump	Leather Cone	4.4, 8, 13, 20	Chains	Wood	Rubber	36x3.9 36x4.3	6600 pounds	200 in. 77 in.
DELAHAYE.....	Monobloc 3.3x5.1	Bonnet	1200	Delahaye	Pump	Gear Pump	Leather Cone	4.4, 8, 13, 20	Chains	Wood	Rubber	36x3.9 36x4.3	5000 pounds	197 in. 85 in.
PANHARD LEVASSOR.....	Pairs 3.5x5.1	Under feet	1000	Krebs	Pump	Circulating	Disc	2.4, 5, 7, 16.6	Chains	Wood	Rubber	40x4.7 40x4.7	7600 pounds	207 in. 79 in.
RENAULT.....	Pairs 4.3x6.2	Bonnet	1200	Renault	Thermo Syphon	Circulating	Leather Cone	2, 4.3, 6, 8.6	Shaft	Wood	Rubber	37x5.5 40x6.2	5600 pounds	164 in. 79 in.
LATIL.....	Monobloc 3.7x5.5	Bonnet	1000	Solex	Thermo Syphon	Pump Constant Level	Leather Cone		Direct to frontwheels	Wood front Steel rear	Creusot	36x3.5	5500 pounds	222 in.
LATIL.....	4.3x6.2 Monobloc	Bonnet	1000	Solex	Thermo Syphon	Pump Constant Level	Leather Cone		Direct to frontwheels	Wood front Steel rear	Steel	36x3.9	6100 pounds	202 in.
LATIL, four wheel drive tractor.....	Monobloc 4.3x6.2	Bonnet	1000	Solex	Thermo Syphon	Pump Constant Level	Leather Cone		Four Wheels Driven	Cast Steel	Rubber	40x4.3 Twin 40x4.3	5555 pounds	212 in.
BALACHOWSKY & CAIRE.....	Monobloc 3.9x5.9	Under feet	1000	Claudel	Pump	Pressure			Electric	Cast Steel	Rubber	36x4.7 36x4.7	6100 pounds	
DE DION BOUTON.....	Pairs 3.1x5.5	Under feet	1400	Zenith	Pump	Pressure	Disc	2.5, 6.3, 10, 15	Cardon	Wood	Rubber	36x4.3 36x4.3	5200 pounds	206 in. 79 in.
DE DION BOUTON.....	Pairs 3.9x5.5	Bonnet	1400	Zenith	Pump	Pressure	Plate	2.4, 12, 18	Cardon	Wood	Rubber	36x4.7 36x4.7	6200 pounds	232 in. 78 in.
DE DION BOUTON.....	3.9x5.5 Pairs	Under feet	1400	Zenith	Pump	Pressure	Plate	2.4 6.2, 9.9, 10.5, 16	Cardon	Wood	Rubber	37x5.1 37x5.1	6900 pounds	229 in. 79 in.
ROCHET SCHNEIDER.....	Pairs 3.7x5.5	Bonnet	1400	Zenith	Thermo Syphon	Pressure	Leather Cone	4.3, 6.8, 10.5, 15.5	Chains	Wood		36x4.7 40x5.1	6700 pounds	236 in. 78 in.
DELAUGERE CLAYETTE.....	Pairs 3.9x5.5	Bonnet	1100	D. & C.	Thermo Syphon	Circulating	Leather Cone	3.7, 6.2, 9.9, 12.4	Chains	Wood		36x4.3 37x5.5	6100 pounds	236 in. 78 in.
DELAUGERE CLAYETTE.....	Pairs 3.9x5.5	Under feet	1100	D. & C.	Thermo Syphon	Circulating	Leather Cone	3.7, 6.2, 9.9, 12.4	Chains	Wood		37x5.1 37x5.1	7800 pounds	216 in. 78 in.
BERLIET.....	3.9x5.5 Monobloc	Bonnet	1000	Berliet	Thermo Syphon	Circulating	Disc		Chains	Wood		37x5.1 39x5.1	5900 pounds	
BERLIET.....	3.9x5.5 Monobloc	Under feet	1000	Berliet	Thermo Syphon	Circulating	Disc		Chains	Wood		37x5.1 39x5.1	7500 pounds	
BERLIET.....	3.9x5.5 Monobloc	Bonnet	1000	Berliet	Thermo Syphon	Circulating	Disc		Chains	Wood	Rubber	37x5.1 39x5.1	6200 pounds	
BERLIET.....	3.5x5.5 Monobloc	Bonnet	1200	Berliet	Thermo Syphon	Circulating	Disc		Shaft	Wood	Rubber	36x4.7 40x4.7	5200 pounds	
MOTOBLOC.....	Pairs 3.1x5.6	Bonnet	1400	Motobloc	Pump	Pressure	Disc		Chains	Wood	Rubber	36x3.9 36x3.9	4700 pounds	244 in. 70 in.
SAUERER.....	Pairs 4.3x5.5	Bonnet	850	Saurer	Pump	Pressure	Disc	37, 7.4, 11, 15	Shaft	Wood	Rubber	36x4.3 40x4.7	5100 pounds	236 in. 67 in.
SAUERER.....	Pairs 4.3x5.5	Bonnet	1000	Saurer	Pump	Pressure	Leather Cone	3.7, 7.4, 11, 15	Chains	Wood	Rubber	36x4.7 39x5.1	6600 pounds	237 in. 79 in.
SAUERER.....	Pairs 4.3x5.5	Bonnet	1000	Saurer	Pump	Pressure	Leather Cone	3, 6, 9, 12.2	Chains	Wood	Rubber	36x4.7 40x6.2	6600 pounds	255 in. 82 in.
BRASIER.....	Pairs 3.3x5.5	Under feet	1400	Brasier	Thermo Syphon	Circulating	Leather Cone	3.2, 11, 8, 12.5	Chains	Wood	Rubber	36x4.7 36x4.7	5500 pounds	204 in. 82 in.
BRASIER.....	Pairs 3.9x5.9	Under feet	1350	Brasier	Pump	Circulating	Leather Cone	4, 6, 8, 12	Chains	Wood	Rubber	36x4.7 36x4.7	7500 pounds	204 in. 82 in.
LA BUIRE.....	Pairs 3.5x6.2	Bonnet	1000	Zenith	Pump	Pressure Trough	Disc	3.2, 5, 8.7, 13	Shaft	Wood	Rubber	40x4.7 40x5.1	7300 pounds	182 in. 75 in.
PEUGEOT.....	Monobloc 3.5x5.9	Bonnet	1000	Zenith	Pump	Pressure & troughs	Disc	3, 6.2, 10, 15.5	Shaft and Worm	Cast Steel	Rubber	36x3.9 40x4.3	5000 pounds	228 in. 75 in.
PEUGEOT.....	Monobloc 3.5x5.9	Bonnet	1000	Zenith	Pump	Pressure & troughs	Disc	3, 6.2, 10, 15.5	Shaft	Cast Steel	Rubber	36x4.7 36x4.7	6400 pounds	228 in. 75 in.
PEUGEOT.....	Monobloc 4.7x5.9	Underfeet	1000	Zenith	Pump	Pressure & troughs	Disc		Chains	Cast Steel	Rubber	37x5.5 37x5.5	7000 pounds	236 in. 78 in.
CLEMENT BAYARD.....	Pairs 3.5x5.5	Underfeet	1500	Clement Bayard	Thermo Syphon	Circulating	Leather Cone		Chains	Steel Disc	Rubber	36x4.7 40x4.7	6100 pounds	196 in. 78 in.
LORRAINE DIETRICH.....	Monobloc 3.7x5.6	Underfeet	1000	Dietrich	Thermo Syphon	Circulating	Leather Cone	3.5, 6.2, 8.7, 13	Chains	Wood	Rubber	36x4.7 40x4.7	6800 pounds	196 in. 78 in.
ARIES.....	Monobloc 2.9x5.5	Bonnet	1300	Claudel	Thermo Syphon	Pressure	Disc	4.3, 6.8, 10, 15.5	Chains	Wood	Rubber	36x3.9 36x3.9	4400 pounds	224 in. 79 in.
ARIES.....	Monobloc 3.5x5.9	Bonnet	1250	Claudel	Thermo Syphon	Pressure	Disc	3.8, 7.4, 9.9, 15.5	Chains	Wood	Rubber	40x4.7 40x4.7	6600 pounds	224 in. 79 in.
ARIES.....	Pairs 4.0x6.2	Underfeet	1000	Claudel	Pump	Pressure	Disc	3.2, 5.6, 7.5, 12.5	Chains	Wood	Rubber front Steel rear	37x5.1	8000 pounds	225 in. 80 in.
PEUGEOT.....	Monobloc 3.5x5.9	Bonnet	1000	Zenith	Pump	Pressure & troughs	Disc		Chains	Wood	Rubber	36x4.7 40x4.7	6600 pounds	225 in. 90 in.

The rear wheels of all machines are fitted with twin tires. All motors have four cylinders. All machines have four speed gear-boxes; high-tension ignition is used in all cases. *These trucks (Renault, Latil, Saurer, Peugeot) also haul one or two trailers. Under heading speed is understood speed of the vehicle on different gears with motor at normal number of revolution

FEW FORD FACTS FOR WOLVERINE

Motor Will Turn Over at 2,400 Revolutions per Minute

SOUTH HAVEN, MICH.—Editor Motor Age—I would like to have the following questions answered:

1—What is the maximum motor speed of the average Ford car?

2—What is the speed of the motor when the car is traveling 15 miles per hour?

3—Is it proper to line up the front wheels of a 6-60 Premier with a cord, adjusting the tie rod until the cord touches both edges of the tire above the hub caps on front and rear wheels.

4—In the battery distributor system on this car, 1910 Premier 6-60, we cannot get this system to work. The coil will buzz, but we cannot get any spark at the distributor or plugs. Everything seems to be all right as far as I have been able to see. It is in time and several new parts have been substituted. I would be pleased to have a solution of this trouble. A Reader.

1—According to a technical man at the Ford branch in Chicago, the motor will turn over 2,400 revolutions per minute.

2—About 800 revolutions per minute.

3—The Premier Chicago agent says that the cord should be placed below the hub caps. It may be well to see that the toe-in of the front wheels of the 6-60 Premier is $\frac{1}{4}$ inch and the dish from $\frac{3}{8}$ to $\frac{1}{2}$ inch.

4—The fact that the coil buzzes seems to indicate that the trouble lies in the wires leading from the coil to the rest of the system. The distributor board should be examined and the contact segments cleaned thoroughly and oiled a little. See that the gap at the spark plug terminals are not too great nor too little. The usual form of spark plug calls for $\frac{3}{32}$ inch clearance at the plug terminals. Trace all connections and see that the ends of the wires are clean and that they make perfect contact. Sometimes a coil will buzz and still fail to start the motor, owing to the vibrator points being poorly adjusted.

PUMP INEFFICIENT AT LOW SPEEDS

Oiling System of Matheson Six Is by Gear Pump

Birmingham, Ala.—Editor Motor Age—What is the trouble when, at low motor speeds, the oil pump fails to pump oil up to the sight feed on the dash of a Matheson six, model 18. The oil going through this sight feed goes to the rear main bearings, which seem to heat up when running on direct drive for a long time. The oil leads are all clear. The other two leads do not carry the oil to the same elevation, and get, therefore, more oil. The gear pump works seemingly all right.

2—Would it be advisable to bypass the sight feed line, keeping all three lines under the same head?

3—Is it possible the clearances in the gear pump are excessive and cause some oil to squeeze back between or above the two gears?



Questions Answered and Communications.

A Reader.....South Haven, Mich.
 Alabamian.....Birmingham, Ala.
 Rose Fay Thomas.....Bethlehem, N. H.
 Ray H. Rawlings.....Rutland, O.
 Walter Collins.....Voltaire, Cal.
 John T. Murphy.....Janesville, Wis.
 Marcus Rawlins.....Memphis, Tenn.
 C. A. Easley.....Beaumont, Tex.
 J. D. G.....Lima, O.
 W. H. Lowe.....Ottawa, Kan.
 Reader.....Chicago
 C. D. Enfield, M. D.....Jefferson, Ia.

CYCLECAR SECTION

I. E. Cook.....Carmen, Okla.
 Bedella.....St. Paul, Minn.
 B. R. Harrington.....Oklahoma City, Okla.
 J. J. Pondelick.....Chicago
 A. B. L.....New York

The oil runs all right at higher motor speeds.
 4—Has anybody ever had the same experience with this car, and how did they overcome the trouble?—Alabamian.

1—The trouble no doubt is caused either by a hole in the oil line or by the oil line being obstructed. In the former case a volume of air would enter the oil line and prevent the oil from reaching the sight feed, and in the latter, of course, the obstruction would hinder the flow. Your statement to the effect that the oil pipes are clear may be true, but as added assurance the pipes should be removed and immersed in gasoline and then air under pressure forced through them.

2—The car being designed so that the oil runs through a sight feed, it would not be advisable to by-pass the oil. In this case one would not know whether too much or too little oil is flowing. Instead of by-passing the oil, the system should be put in good working order.

3—It is possible that the gears have become worn and the clearance so great that the oil will not be forced around at slow motor speeds, but since the gears operate in oil continually one would hardly look to this as the cause. The Matheson service station in Chicago has never met with such a case.

4—Motor Age suggests that you clean all the oil pipes and stop all air leaks in the oil line and at the same time be care-

The Readers

ful about dirt getting into the oil tank. This dirt may make its way to the sight feed and stop up the line.

CAUSE OF FORD COMPRESSION LOSS

Motoriste Suggests Mississippian's Trouble May Be Due to Worn Gasket

Bethlehem, N. H.—Editor Motor Age—Referring to the inquiry of A Reader from Greenville, Miss., in Motor Age of June 19, on page 27, I would like to say that last summer I was bothered with loss of compression in the third cylinder of the motor of my model T Ford for 2 months. As I have no chauffeur, and do not think that amateur tinkering improves the mechanism of a car, I did not try to remedy the trouble myself, but took the car to the best professional mechanics, and also asked all the chauffeurs of my friends to test it out for me in the hope of locating the trouble, but no one could find it.

I took to watching the motor very carefully myself in the garage, while running, both before taking it on the road, while it was still cold, and after bringing it in, while it was hot. I soon concluded that the trouble was in the copper gasket of the cylinder head bolts. On examination the mechanic at the garage discovered both were worn. I had a new gasket put in and the bolt hole rethreaded for a new bolt a trifle larger than the defective one, and since then the motor has worked perfectly. Perhaps A Reader may find his loss of compression due to one or both of these causes.—Rose Fay Thomas.

RICH MIXTURE USED FOR STARTING

Air Control on Dash Should Be Closed—Cleaning Mohair

Rutland, Ohio—Editor Motor Age—I have a model 60, 1912 Overland, with Schebler carbureter. Upon starting, before the motor warms up, it is impossible to get more than 15 to 18 miles an hour. It does not seem to feed after the throttle is open about so wide. The throttle, however, opens up all right. There is no backfire. After the motor gets warm there is no trouble whatever to get any desired speed. I have this trouble more on a cool morning than at any other time. It can hardly be laid to poor gasoline, for the reason that I have had no such difficulty until lately. Can Motor Age suggest any remedy for it, as it is annoying to have to run 4 or 5 miles before one can make any headway?

2—A mohair hood was put in the boot of the car with a can of oil, the can leaked and oil got on the hood. I have washed the oiled part with strong soapsuds, gasoline, ammonia and everything else that I have heard of that could be applied in such a case, but have found nothing that will take out the oil. As the part with the oil on it comes over the back, it would spoil a lady's waist in about 30 minutes. Can Motor Age suggest any preparation that will remove this grease?—Ray H. Rawlings.

1—The 1912 model 60 Overland has a dash air control of the auxiliary air valve. This air valve should be closed when starting and remain closed until the motor has heated sufficiently to use more air. Your trouble seems to be that the carburetor is feeding an excess of air for starting.

2—There are a number of preparations on the market for cleaning mohair, among

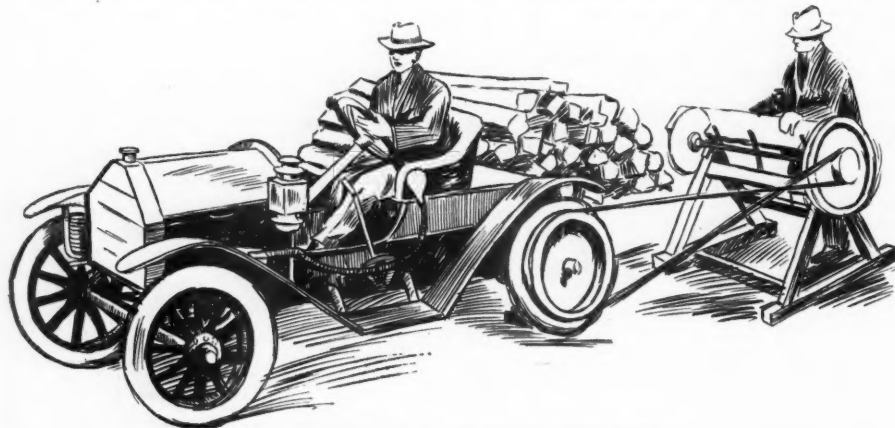


FIG. 1—BRUSH RUNABOUT SAWS WOOD

Clearing House

them being the Pioneer, manufactured by the Northwestern Chemical Co., Marietta, Ohio, and the Success Auto Fabric Cleaner, made by the F. S. Carr Co., Boston. The use of castile soap and clean water has resulted in oil spots being removed, or at least preventing the oil from soiling clothing.

Brush Runabout Saws Wood

Voltaire, Los Angeles Co., Cal.—Editor Motor Age—I live in the mountains of Southern California where wood is plentiful, but the physical exertion necessary to convert it into sizes suitable to feed a cook stove and two big fireplaces is too much for me while there is a motor car doing nothing most of the time, and laughing at my success in raising a copious perspiration.

A few years ago I saw in a magazine a diagram showing how a motor car was anchored and made to saw wood. I think it would interest other readers besides myself if Motor Age would work out the problem and tell us how to do it. The machine I wish to use is a Brush runabout.—Walter Collins.

Motor Age in its issue of November 24, 1910, showed how a Brush runabout was used to saw wood. In Fig. 1 is shown a reproduction of the illustration. The rear axle of the car was jacked up and a belt attached to one of the rear wheels, which was fitted with a pulley. The other end of the belt was run to a pulley at the end of a circular wood saw. One man was feeding wood at the saw while the other operated the throttle as dictated by the man at the saw.

JAY-EYE-SEE AN OLD FIAT CHASSIS National Company Announced a Year Ago Its Retirement from Racing

Janesville, Wis.—Editor Motor Age—What nationality is Joe Dawson? Where was he born?

2—Why did he not enter the last 500-mile race at Indianapolis?

3—What is the bore and stroke of the Jay-Eye-See car driven by Louis Disbrow of the Case racing team?

4—Is this car of American or foreign make?

5—Has the National company quit the racing game?—John T. Murphy.

1—Dawson is an American and was born in Odon, Ind., July 17, 1889.

2—The Deltal car which Dawson was scheduled to drive was withdrawn before the race.

3—The motor of the Jay-Eye-See has a bore of 9 $\frac{1}{4}$ and a stroke of 8 $\frac{1}{2}$ inches.

4—The Jay-Eye-See is a Fiat chassis rebuilt with a special body by its owner, Louis Disbrow.

5—After the 500-mile race in 1912 the National Motor Vehicle Co. announced its retirement from the racing field.

TIMKEN MAKES CADILLAC AXLES Copper Tubing for Radiator Construction —Body Design

Memphis, Texas—Editor Motor Age—Who manufactures the front and rear axle for the Cadillac cars? I have heard it said that they were made by the Cadillac Company and o. kd. by the Timken Axle Co. Is this right or does the Timken Axle Co. make them?

2—Where can I obtain a quantity of copper tubing, say $\frac{1}{4}$ inch, suitable for constructing radiators of the cellular type?

3—I want a design for stream-line body to be used on a model 17, 1910 Buick, design to

cover the radiator, hood and body. I want a body so constructed that it can be used for both touring and fast work on the track.—Marcus Rawlins.

1—Both front and rear axles of Cadillac cars are made by the Timken Axle Co.

2—Baltimore Tube Co., Baltimore, Md.; Bridgeport Brass Co., Bridgeport, Conn.; American Brass Co., Kenosha, Wis.; National Brass and Copper Tube Co., New York make suitable tubing for constructing radiators.

3—The design of such a body is possible, but it would require so much structural detail that Motor Age advises you to abandon the idea. It would in all probability require much drilling and the work and cost of materials would not give any great returns. The two bodies on the single chassis would make a cumbersome car and it is a question whether any appreciable speed could be attained in touring or on a track.

HEAVY OIL FOR THE DRIVING GEARS Horsepower of Small Teetor Motor— Speed of American

Beaumont, Tex.—Editor Motor Age—Who makes the motor for the type 34-A, 4 $\frac{1}{2}$ by 5 American car? What horsepower does it develop on block test?

2—What is the speed of this car, four-passenger, fully equipped?

3—Which is better to use in the transmission, heavy oil or grease?

1—A Teetor motor is used on the American type 34-A. The S. A. E. horsepower is 32.40. The Teetor Motor Co., Hagerstown, Md., will give you definite information about the motor's performance in the block test.

2—According to the Chicago agent, the car is capable of attaining a speed of 65 miles per hour.

3—Heavy oil is considered better than grease, but some owners use the latter for quieting the gears temporarily.

Adjustments of Marvel Carbureter

Lima, O.—Editor Motor Age—Would like an explanation of the adjustment of the carbureter used on the Little Four 1913 model.—J. D. G.

The Marvel carbureter as used on the Little car is known as the model SH, and is shown in Fig. 2. The needle valve G

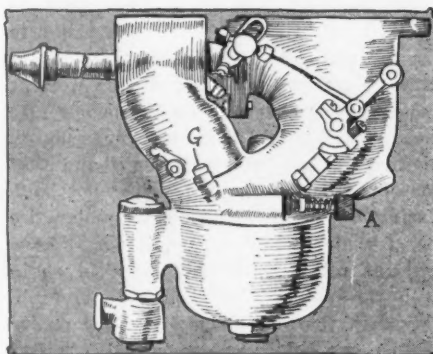


FIG. 2—SHOWING ADJUSTMENTS OF MARVEL CARBURETER

should be turned to the right all the way without straining and then turned back, or to the left, two turns. The air adjusting screw A should be turned to the left or backed out until it just stops and then turned to the right, three turns. With these adjustments of the carbureter the motor should be started with the throttle about $\frac{1}{3}$ open. Gradually close the throttle.

Turn the needle valve to the left or right until the motor runs at its maximum speed on the same throttle setting. That is, keep the throttle on the steering wheel set and then turn the needle valve to the left, let us say. If the motor speeds up, keep turning until it just begins to slow down and then turn it back just a little.

If the motor stops when the needle valve is turned to the left turn it to the right again after starting. If a good needle valve setting is obtained the air valve should be turned slightly either to the left or right with the object of obtaining still greater motor speed with the same throttle setting. The throttle then should be opened wide and closed suddenly. If the motor pops or misses the needle valve should be further turned either to the left or right, whichever direction gives the best results.

ALCOHOL AS A CARBON REMOVER Experiments by Engineer Resulted Successfully.

Ottawa, Kan.—Editor Motor Age—Please give me some information regarding denatured alcohol as a carbon remover, and if it will injure the engine.—W. H. Lowe.

A test conducted recently by Joseph A. Anglada, chairman metropolitan section, Society of Automobile Engineers, showed the following results, which are set forth in a booklet by the author.

1—That denatured alcohol is an efficient decarbonizer for motor car engines.

2—That it does not injuriously affect the surfaces of the metals with which it comes in contact.

3—The best results from the use of denatured alcohol as a decarbonizer are obtained when the combustion space of a hot engine is filled entirely with the alcohol and this permitted to remain in the space for a period not less than 6 hours.

6—Denatured alcohol will act as a carbon remover when the engine is cold provided the liquid alcohol is in contact with the carbon covered surfaces. However, the action in this case is not as rapid as if the engine were hot.

Ford Wheels Made the Same Size

Editor Motor Age—In Motor Age, issue of June 26, Winfield Morcross asked how the Ford could be arranged so that 30 by 3 $\frac{1}{2}$ tires could be used all around. Several owners in this section simply purchased rear wheels minus the hubs from the Ford company and substituted the front hubs from the old wheels in place of them. This has proved satisfactory in many cases.—Reader.



ALL MANUFACTURERS NOT HONEST Examples Given of Gross Unfairness on the Maker's Part.

JEFFERSON, IA.—Editor Motor Age—A prominent manufacturer of motor cars once said, "A man in business who is not honest is nothing less than a fool." He was addressing salesmen, but he did not confine his dictum to the sales force. Had he been talking to a meeting of manufacturers his remark would have been no less to the point; possibly more so, because if a car is not honestly built it is rather difficult to sell it honestly and make much of a record.

The day once was when any man who bought a motor car was virtually gambling with only the possibility of getting somewhere near his money's worth as the grand prize. Nowadays nearly every number is a prize, more or less; practically every buyer gets nearly what he pays for and he who draws a blank must be indeed unlucky. Take a day off and watch the relics go by. Some of the old ones are decrepit, wheezy, rattling bunches of junk which remind you of certain ancient invalids who exist from day to day merely by grace of the medicine cabinet and exceeding care.

Honestly Made Cars Stand Up

But you will see another type; cars of about the same vintage as the wrecks, which, however, are still able to run smoothly and quietly, take their grades easily on high and generally give an impression of carrying their years extremely well; some of them so well as to recall the picture of a young gentleman of 91 who rushes blithely up three flights of stairs to his office every morning while his grandsons wait for the elevator.

What was the difference in these cars when they were new, which makes them bear their service in such widely varying ways? Honesty of construction probably, opposed to a frantic desire to turn out quickly something that would meet another pay roll. Of course, the good ones have had better care, but that was because they deserved it. The men who made them did the best job of which they were capable; used the best engineering talent obtainable, and built a reputation as well as cars.

Cars are becoming more alike every year. At present two general types will include a very large percentage of all cars made in this country. We may take as standards a comparatively small four-cylinder car rating, say, 25 horsepower by the S A E formula, and a somewhat larger six carrying about 35 horsepower. In both classes the motors are water-cooled, poppet-valve constructions with the bore somewhat less than the stroke. Both are shaft-driven and have selective transmissions. Though these two types probably

would not cover a majority of all American cars, they would cover the product of more than half the American manufacturers. It goes without saying that there are some very successful exponents of other ideas than those incorporated in these standard cars, but they are numerically in the minority.

Justice Should Be the Service Policy

The chances are, then, that when you buy your new car you will not get any startling innovation, which is the sole property of one builder. The chances are rather that your car will, in its essentials, closely resemble half a dozen others at about the same cost. True, there will be various selling points which will be strongly impressed upon you, but the chances are that they do not constitute really vital differences between the car you buy and the ones you consider. Doubtless they make for comfort, or convenience, or ease of operation; very important points, too, but not very directly connected with real mechanical efficiency. There is, however, one thing which, if you could know about it, would influence you more than electric cigar lighters or pneumatic gearshifts, convenient as these may be, and that thing is plain honesty; honesty in construction, honesty in sales methods and rigid honesty and justice as a service policy.

If one maker in every price class should start the 1914 season with a policy of thorough, absolute fair dealing from the time the material was ordered until the last part had been sold which could reinforce a worn-out mechanism, and continue it rigidly, there could be but one of two results; either these builders would in the course of years find themselves the only men in the business, or the other makers would have survived only by adopting the same policy. There are many "square deal" motor car manufacturers, more every year, and they are getting their reward. Only some of them do not go quite far enough.

Take the matter of tire equipment. Many cars this year carry tires $\frac{1}{2}$ -inch smaller than the car weight calls for. The result is that the user gets about 2,000 miles from his first set of tires when he should have had 5,000. If he complains to the car maker he is told that they do not make or guarantee the tires they use; he should have written to the tire people. He does so; and is told that the casings put on his machine are too small for it and that consequently the guarantee does not hold. Basing the figures on a very popular tire size for medium-price cars, it would have cost, at retail, about \$40 more to equip with the proper size shoes. It is probably fair, then, to assume that the maker of the car could have rectified for less than \$30 a tire, a mistake which costs the owner about \$100.

Discussions by Readers of Motor Age

Very fortunately the places where so-called economies of this sort can be practiced without seriously impairing appearance or the first year's running qualities, are not numerous. Yet the number of cars which have earned a black eye through some of these petty savings, in bearings, for instance, or rear axle construction, might be really amazing to some complacent manufacturers. Probably they do not realize that it would, in a small town at least, puzzle William J. Burns himself to conceal the exact nature and extent of his motor car troubles. Let the owner of a new car be seen walking only two or three blocks and somebody wants to know "What's the matter with your car," and they find out, too.

The typical farmer's argument that the fellow with the \$5,000 car seems to be laid up for repairs just as often and just as long as the man with the \$700 affair, if anywhere near the truth, is a pretty good one, the moral of which would seem to be that we ought to have better built small cars, at whatever increase of price is necessary. People will pay for them gladly as soon as they find them out, and in time will come to insist upon them. And then, less of that tendency to step aside and let the owner stand the gaff when trouble comes which is really due to faulty design or construction.

An Example of Unfairness

Possibly the day may even come when providing a luckless owner with \$5 worth of parts, always providing the defect has shown up in 90 days, and then permitting him to spend \$15 getting them installed, will no longer be considered the acme of fair dealing.

We recall one service department which plumed itself considerably on making a price reduction on a new pair of cylinders when one of the old ones had been found to be tapered, and 37 thousandths of an inch too large at the top. They were willing to admit that the cylinder must have been defective to practically that extent when the car left the factory floor; the trouble was that the unfortunate driver could not find anyone able to locate the awful pound in his motor until after the time limit had expired. The owner thought that service department should have been taken out in a bunch and shot at sunrise; they thought they were really awfully decent not to hold him up for the full price, as originally was their intention.

But these things are becoming rare enough to tell about, probably no more common than an instance recently of the service department of a large factory actually paying for the time used in installing new parts in place of some defective ones. So let us not be downcast; fairer dealing and better understanding between maker and user seem to be well on the way.—C. D. Enfield, M. D.

Interesting Data for Cyclecar Admirers



BOAT MOTOR NOT FOR CYCLECAR Steering Gears and Body Materials for Light Cars.

CARMEN, OKLA.—Editor Motor Age—I am designing a cyclecar and have been following the Cyclecar Section of Motor Age closely. I have a two-cycle, four-horsepower boat motor weighing about 100 pounds, and figure on using flat belt drive with idler to jacketshaft for clutch effect. With this reversible engine I would have my reverse without a reverse gear. Does Motor Age think this would make a satisfactory power unit for a slow speed tandem machine. Please suggest the best way to make my steering apparatus and method of attaching it to the body; also a good, cheap way to build the body.—I. E. Cook.

The drive you mention would do as a makeshift, but is troublesome and hardly reliable. The same might be said of the motor for this kind of work. You might get some fun out of the car you mention, but hardly a practicable vehicle.

The best way to steer the lighter cyclecars is still a question. The best for the money is the type used on motor boats, the steering wheel winding a steel cable about a drum, and this, through pulleys, working the steering arms. The control is very sweet and reliable, and very cheap to make.

SMALL GARAGE TO MAKE CYCLECAR Wants to Utilize Waste Space for Manufacturing

St. Paul, Minn.—Editor Motor Age—Having a small shop which is not working to capacity, its size and equipment being about that of an ordinary city garage shop, and wanting to make it produce a dividend I am planning to build cyclecars of some such type as has been described by Motor Age, with the idea of developing a business. What type of car would Motor Age advise as best to start with?—Bedella.

It would be impossible to tell definitely what type of machine your small shop would produce without having a list of the tools you have at hand and the space as well. It is possible to state, however, that for your work you had better stick to the simple type rather than the small-car type. The latter takes more equipment, more initial outlay and as a result is harder to sell on account of its higher price and greater complication. The simple type can be made just as reliable at far less manufacturing cost.

For this car Motor Age would advise a wooden frame reinforced, where fittings fasten, with sheet steel or stout washers. You should use an air-cooled motor, preferably of the V type. The 90-degree type gives best balance, but cannot be purchased, so you had better try standard motorcycle motors to start with.

The transmission can be of a number of types, so you bear simplicity in mind as the first thing to be considered after reliability. Friction and belts can be used or chain to countershaft and belts to the rear. This latter, by using two sized sprockets on the motor and dog clutches, can give two speeds.

If you use tandem seating, which will give the most speed and comfort, you had better use belt-drive to the rear, using

large V belts over pulleys larger than used on motorcycles. If you use side-by-side seating—adopt the 36-inch tread in either case as a coming standard in all probability—you can use chain-drive to the rear axle and dispense with differential. It has been found that a differential is not necessary on these light narrow cars even with rigid drives.

For the rest of the car keep the weight low, and every part simple. Fit an outside flywheel to the motor if possible. Make the seating and springing as comfortable as possible, and the workmanship and material of the best. Many a small shop such as yours will grow to be a real cyclecar plant in the next few years if a business head is used along with the mechanical end of the shop.

Eight-Passenger Cyclecar Impracticable

Oklahoma City, Okla.—Editor Motor Age—I see the cyclecar is about to be on the market as a new and apparently useful vehicle. I have thought of an idea which appears quite practical—a tandem car carrying six, eight, or ten persons, with a very long body like a canoe, the front wheels to cut under similar to drays or hacks, so it could be turned within its length. It certainly should take with outing parties, especially with picnicing, hunting and fishing parties.—B. K. Harrington.

There would be no advantage in placing the number of passengers you mention tandem, but rather disadvantages. The idea is spectacular and might be good for an advertising scheme, but hardly for practical use.

The main advantage of tandem seating outside of wind resistance elimination, is in obtaining correct springing whether one or two or more passengers are aboard. There would be no particular advantage in a car of the size you suggest as the weight in the first place would be great enough to demand stiff springs which would not be extra sensitive to the added weight on one side or the other.

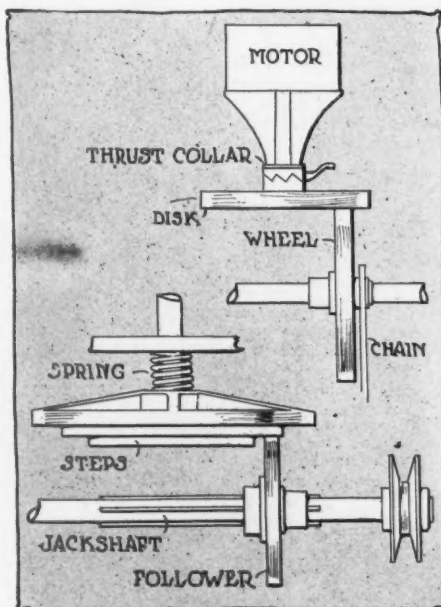


FIG. 3—TYPES OF CYCLECAR-FRICTION DRIVES

ENGINES AND DRIVES FOR CARS Types of Friction Transmission Suitable for Cyclecar

Chicago, Ill.—Editor Motor Age—I intend to build a small car and would like to know if an air-cooled engine is advisable to use or not. I would like a four-cylinder, 12 to 15 horsepower, running off a magneto. Kindly inform me what manufacturer makes such an engine as the above, if it is advisable to use such.

I also want to know where I can get diagrams of all types of friction drives used on cars up to the present time. If same are shown in back numbers of Motor Age send them to me. My reasons for wanting diagrams of the drives are I have an idea of a friction drive and want to know if anything similar is, or has ever been used by any manufacturer. If not, I intend to experiment with same on my car.—J. J. Pondelick.

An air-cooled motor does very well on a small car or cyclecar for two if correctly designed for cooling and load. There is no four-cylinder air-cooled motor of the size you mention on the market, so far as Motor Age knows. The nearest are the Henderson and Pierce motorcycle motors, mentioned before in these columns.

The patent office at Washington would furnish you with all friction drive patents issued in America at 10 cents each. Friction drive, if made with large disks and wheels and narrow-faced follower, is excellent for these small-powered, high-speed motors.

The upper illustration in Fig. 3 is the standard method, the disk on the engine shaft driving a follower on the jackshaft from which drive goes by chain to the rear. Traction is obtained by thrusting the wheel against the disk or by moving the disk forward against the wheel.

Some foreign firms use a spring for this thrust, but this gives too great pressure on high gear for the requisite pressure on low. A new foreign gear makes the disk in steps to equalize the spring pressure at different speed positions, as in the lower illustration.

ADVANTAGES OF CHAIN AND BELT Latter Is Quiet, Cheap and Efficient— Former for Speed Work

New York—Editor Motor Age—What are the advantages of belt drive for motorcycles, and of chain drive? Will either do for cyclecars and which is best?—A. B. L.

Both have advantages. The belt drive is quiet, cheap and efficient, possibly a little less efficient as a transmitter of power than a chain, but more efficient as a saver of machinery and rider from shock. It was an ideal drive on low powered motorcycles but with the adoption of big twins the short length between pulleys and the small pulley diameters which are an absolute necessity on a motorcycle demanded too much size and tension for a single belt to stand. With the cyclecar the belt centers can be far apart—the further the better—and the pulley diameters large.

Chain drive has advantages for speed and can be used very well when not too long. For use from countershaft to rear wheels on a cyclecar the length would be too great on a tandem type.

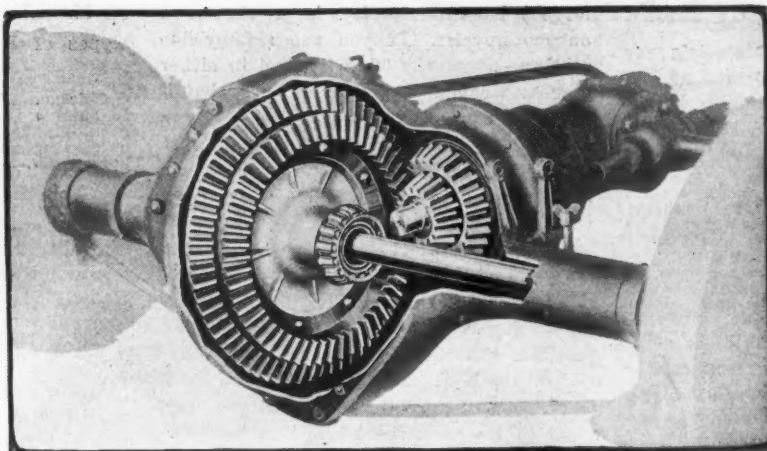
Two-Speed Axle and Hinged Steering on 1914 Cadillac

Two Different Gear Ratios Used, Either Put Into Operation by an Electric Switch

WITH several important constructional changes and refinements here and there, the Cadillac for the 1914 season this week emerges from its hiding place for the consideration of the public. The policy of building a single chassis model with a four-cylinder power plant is still adhered to by the Cadillac company. Bodies have been redesigned, certain chassis details have been altered, but no change of any consequence has been made in the characteristic Cadillac motor.

The biggest change on the new Cadillac is the adoption of a two-speed-direct-drive axle to replace the conventional single type. Instead of having one bevel driving pinion connected with the propeller shaft and a single bevel driven gear as in the ordinary construction, the Cadillac now is fitted with two bevel pinions and two bevel gears. This affords two different gear ratios, each driving direct from the engine to the axle without intermediate gearing. The low gearing gives a ratio of 3.66 to 1, while the high is 2.5 to 1.

Clutches engage either set of gears in-

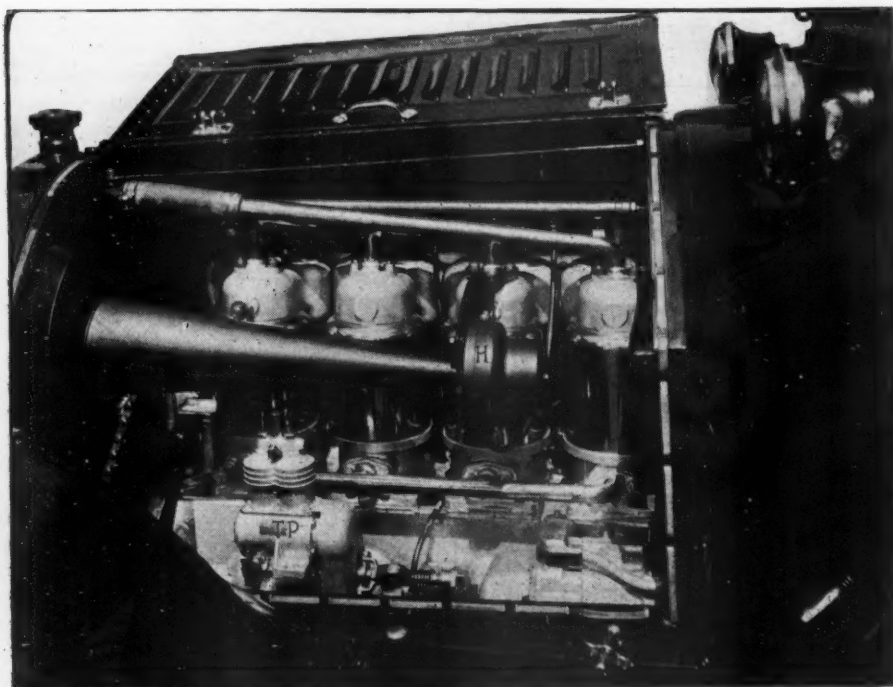


THE CADILLAC TWO-SPEED AXLE



SOME CADILLAC DETAILS

Lever G operates latch for changing axle gears, speedometer S and horn button H



LEFT SIDE OF CADILLAC MOTOR SHOWING TIRE PUMP TP AND HORN H

New Steering Permits Car to be Entered from Right Side—Hinged Seat a Feature

dividually, suitable interlocking devices preventing the engagement of one set while the other set is still operating. The changing from one set to the other is a very simple matter, and one which is noiseless. A small switch located on the right front door of the body and with-

in convenient reach of the driver does the selecting of the gear combination, while the actual shifting is done by simply pressing in the clutch pedal. Throwing the switch one way magnetically draws the corresponding latch into position, and the pressure on the clutch pedal pulls its set of gears into action, at the same time releasing the other set.

Motor Age was given a demonstration of this new feature. The only perceptible change which the shifting to the 2.5 to 1 ratio made was in the slowing down of the speed of the motor for the same car speed as that maintained with the 3.66 to 1 ratio. There was absolutely no noise connected with the changing of driving gears. Shifts from one set to the other were made at speeds of 25, 30 and 40 miles an hour with equal facility, it being easy to tell when the 2.5 to 1 gearing was operating by the easier running of the engine and the general smoother operation of the car as a whole. There was a marked freedom from vibration when traveling at high speeds.

It is pointed out that the low drive is especially adapted for city driving, where starting, stopping and slowing down are frequent and where cautious operation is necessary. Where speeds of about 16 miles or more per hour are permissible and desirable the high direct drive gear ratio is of special advantage. With it, any given speed of the engine produces an increase of about 42 per cent in the speed of the car, or conversely, to maintain any given car speed, the engine speed may be materially decreased as compared with that required to propel the car at this speed with the low gear ratio.

On test it was found that at an engine speed of 700 revolutions per minute with the low direct gear engaged the car traveled about 21 miles an hour, while with the high gearing it went about 30 miles an hour, the engine speed still remaining constant.

This increase in car speed in its rela-

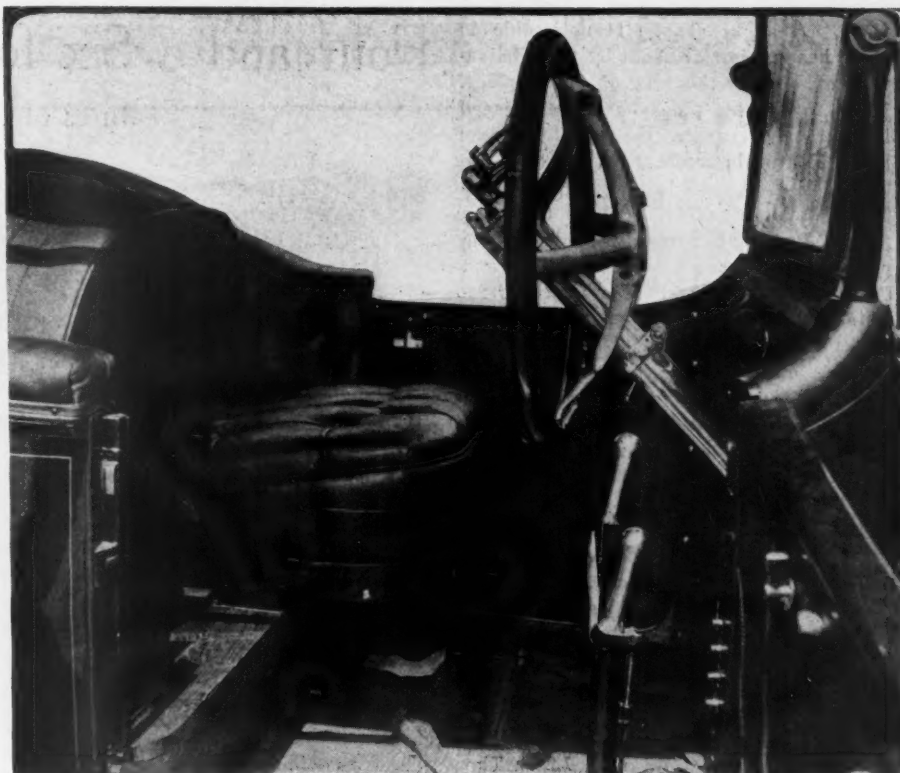
tion to that of the motor is logically claimed to effect a saving in gasoline for a given mileage, while friction is reduced due to slower operation of the motor. This, too, should affect the gasoline consumption.

This new axle feature does not affect the transmission gearing in any way, that is, with either set of axle gears operating, the shifting of gears from first to second to third or to reverse in the gearbox is the same as though the ordinary axle were used. Thus this two-speed axle makes possible six different speeds forward.

The new Cadillac also has special provision for easy access to the driver's seat from the drive side of the car. This is made possible through the hinging of one of the arms of the steering wheel so that the wheel will drop into a vertical position as shown in one of the illustrations. The arm opposite is made in U-shape to go around the steering column, while there are two latches at the top of the column, which engage notches near the center of the spider and hold the wheel rigidly in normal position when driving. Two small levers when pressed together release the wheel and allow it to swing downward.

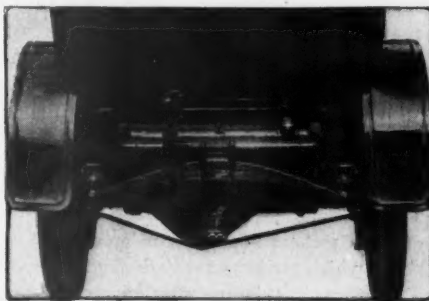
To further open the entrance, the driver's seat is hinged so as to swing up out of the doorway, while the gear-shifting and emergency brake levers, which are both within the body and next to the door, are so positioned as not to interfere. They are somewhat forward of the wheel when it is in vertical position, although within easy reach of the driver when seated. No doubt the designers had the fat man in mind when they made these changes.

The combination Delco cranking, lighting and ignition system is retained, though several refinements have been made. Ignition is now taken care of by a dual system, a double arrangement having been used heretofore, employing two sets of spark plugs. But one set now is required, simplifying the wiring to a great extent. Besides the Delco generator which provides ignition current, there is an auxiliary set of dry cells, a single high-



HINGED STEERING WHEEL AND DRIVER'S SEAT OF NEW CADILLAC

tension distributor taking care of either source. Both ignitions are provided with an automatic spark control in addition to the spark control on the steering.



HOW THE CADILLAC APPEARS AT THE REAR

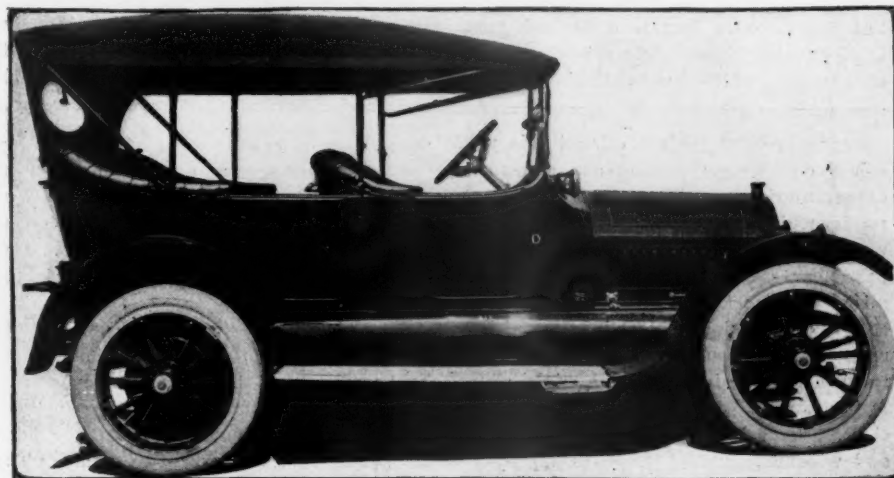
Note the position of the gasoline tank which in former models was under the seat

The speed of cranking has been increased somewhat. In addition to this improvement an automatic temperature regulator has been placed on the voltage regulator. This, together with the cut-out relay and battery ignition relay are now contained in a metal box attached to the back of the dash under the hood.

To further simplify the electrical system, the controlling switch on the generator is dispensed with, its functions now being formed by one of the motor brushes. This brush is so arranged that it is brought into contact with the motor commutator when the clutch pedal is pushed out to bring the cranking device into operation, and is brought away from the commutator when the clutch pedal is allowed to come back after the engine has started. When the brush is brought away from the motor commutator, contacts are closed, thereby bringing the generator into operation.

This year the gasoline tank is placed at the rear of the chassis and under the frame. It is back of the axle, and between this member and the rear cross spring. The gasoline tank capacity is 20 gallons, the fuel being fed to the carburetor by a pressure system, operated by an air pump attached to the crankcase of the motor and driven from the camshaft. A fuel gauge shows the amount of gasoline in the tank.

The well known Cadillac motor with its copper water-jacketed, singly-cast cylinders is retained. The cylinder heads are removable, so that it is a comparatively easy matter to get at the inside of any cylinder. These heads also carry the valve chambers and pockets integrally with



CADILLAC TOURING CAR SHOWING CURVED FENDERS AND CLEAN RUNNING BOARD

them. A slight change is noticeable in these heads, brought about by the elimination of one of the sets of spark plugs. Heretofore, these plugs have been placed in the valve covers, the priming cocks being located between them. But on the new models, the single plug is placed between the two covers in about the same position as that formerly held by the priming cock, while this latter is screwed into one of the covers, the other cover remaining blank.

It might be well to review the salient features of the Cadillac engine for the benefit of those who are not familiar with it. Of L-head design with valves all on the right side, the manifolds are on this side together with the carbureter and distributor. The left side carries the combined Delco motor and generator back next to the flywheel, to which it gears when cranking the engine. Forward of this electrical unit, there is mounted a two-cylinder air-cooled tire pump, a fixture which appears for the first time on Cadillacs as standard equipment.

The engine has dimensions of $4\frac{1}{2}$ inches by $5\frac{3}{4}$ inches bore and stroke respectively, giving a stroke-bore ratio of 1.28. The actual developed horsepower is from 40 to 50. The crankshaft has five main bearings, one between each pair of cylinders and one at either end. The camshaft is carried on three bearings, and this as well as the generator shaft are driven by silent chains from the crankshaft instead of gears.

The motor suspension is also distinctive in that there are two I-beam cross bows from which the engine is hung, one at either end. They bolt to the side frame rails.

The carbureter is somewhat modified on the new cars. A swinging type of air valve has been substituted for the poppet type, while the special auxiliary air inlet has been eliminated. An electrical heating device is added which vaporizes the fuel in the carbureter before the engine is cranked, thereby greatly facilitating starting, especially in cold weather.

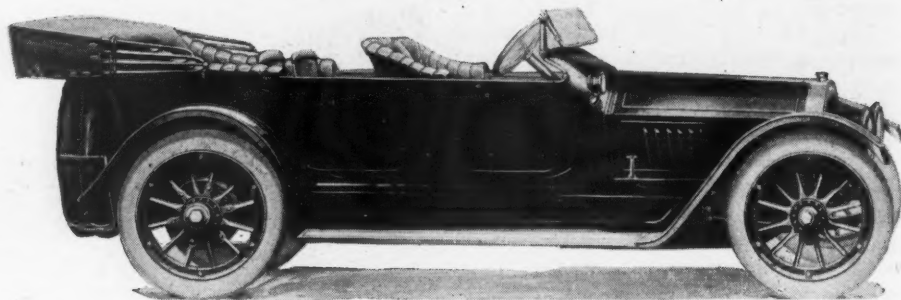
An automatic splash system oils the motor. The cone clutch retains its special spring ring in the flywheel, making for easy engagement. Back of it is the three-speed gearset, hung from two cross members of the frame. The drive shaft, which is uninclosed, is provided with two universal joints, the forward one being telescopic.

The axle is a floating type with pressed steel housing. The principal bearings are of Timken make, and the axle shafts are of a special alloy steel. Though there is nothing new about the front axle construction, an original refinement is to be noted in the concealment of the speedometer driving gears within the left front wheel spindle.

The rear side springs have been increased 6 inches in length over those on the 1913 cars.

Four and a Six for the Cole in 1914

Features of the New Models



COLE COMPANY'S 1914 SIX-CYLINDER MODEL

INSTEAD of three chassis, as marketed in 1913, the Cole Motor Car Co. has announced that the line for the coming year will consist of only two models, a four and a six. These will be of entirely different dimensions than any two models of last year and, besides changing from right to left drive, a great number of material changes are to be noted.

The most important feature of the new Coles is the stream-line body, the beauty of which is added to by the inside door latches and concealed hinges, the curved front fenders, and the clean running boards. The latter effect has been gained by placing the tools in a drawer under the front seat, the battery box under the front floor boards, and the tires in the rear of the chassis.

Cranking, lighting and ignition is by the Delco electric system of the improved type, which operates at 6 volts. The motor generator of this system is mounted on the right side of the crankcase and driven by an extension of the water-pump shaft. The starting switch is bolted to the top of the flywheel housing and operated by a pedal which projects through the toe board. A feature of this installation on the new Cole is the governor for automatically advancing the spark, although a hand control on the steering is provided also.

The four-cylinder chassis has a wheelbase of 120 inches, with 56-inch tread, but for southern buyers a 60 inch tread is given as optional. The same holds true of the six, which has a 136-inch wheel-

base. Both new chassis are practically identical, so far as the unit power plant arrangements, clutch type, etc., are concerned. L-head cylinders cast in pairs are used and dimensions in both cases are $4\frac{1}{4}$ by $5\frac{1}{4}$ -inch bore and stroke.

The unit type of power plant is to be seen on 1914 Coles. A feature of the motor is the water-jacketed intake manifold, which permits of the use of low-grade fuel even in the winter time. It is the preheating of kerosene that makes it suitable for use in motor car engines and the Cole company has taken advantage of this and jacketed the intake manifold. The gasoline is fed by pressure to a Stromberg carbureter and thence to the motor. The pressure is maintained by a motor-driven air pump, which may be regulated to give any desired pressure in the tank. Initial air is forced into the fuel tank by a hand pump fastened to the instrument board. There is provided a gauge on the tank which tells at all times the amount of fuel therein.

Dual ignition is characteristic of the Cole, the Delco motor generator and battery supplying the current. On the four-cylinder model the motor generator is driven by helical gears, while on the six a silent chain is used. The reason one chassis uses chain and the other gears is because in the four the torque is uneven and it has been found that if a chain were used it soon would begin to slap and wear rapidly. However, the nearly even torque of the six has permitted of the

Seven body styles are offered this year—a five-passenger touring car, seven-passenger touring car, four-passenger phaeton, roadster, landaulet coupe for three, five-passenger inside drive limousine and seven-passenger standard limousine. These are all very attractive in design—even more so than were last season's array. The cowl of the open models slopes to meet the hood, which in turn has a slight slope. It is provided with ventilating slots in its sides. Doors have been changed in shape and widened.

On the dash, several new features appear. The speedometer, which is flush with

the dash, is mounted in the corner opposite the drive side and in this position may readily be seen by the driver. Two dash lights are concealed in a ledge at the top of the dash and throw their rays down upon the switches and also upon the gauges.

The wheelbase is left at 120 inches with standard tread of 56 inches, although 61 inches is optional. New equipment this season over that carried last year includes an electric horn mounted under the hood as shown and a power tire pump. The standard finish is Calumet green with a fine gold striping.

use of a silent chain. This method of driving has been carried still further in the six, with the driving of the camshaft by silent chain.

The oiling system is termed splash-pressure. In this oil is drawn from a reservoir which has a capacity of 9 quarts in the four and 12 quarts in the six, and then forced through a sight feed on the instrument board to the main bearings. There are three of these on the four-cylinder model and four on the six. The surplus oil from the bearings drops to a sump from which it is taken and strained and then re-circulated. The cylinders and connecting rods receive their lubrication by splash. The ends of the rods are fitted with spoons which, as they pass through troughs cast in the false bottom of the crankcase, pick up a supply of oil.

Positive water circulation is obtained by the use of a centrifugal pump, which is assisted in cooling the motor by a fan and Mayo radiator.

The connecting link between motor and gearset is a leather-faced cone clutch, with an aluminum web. This clutch operates on ball bearings, and is held in place by six coil springs. Clutch spinning is prevented by the use of a leather brake on the rear end of the clutch hub.

The drive from the clutch is through a three-speed selective gearset, the feature of which is the serrated shifter shaft. The ratios of the gearset are given as 3.65 to 1 on first, 2 to 1 on second and 1 to 1 on high. The ratio between motor and rear axle is 4 to 1 on high.

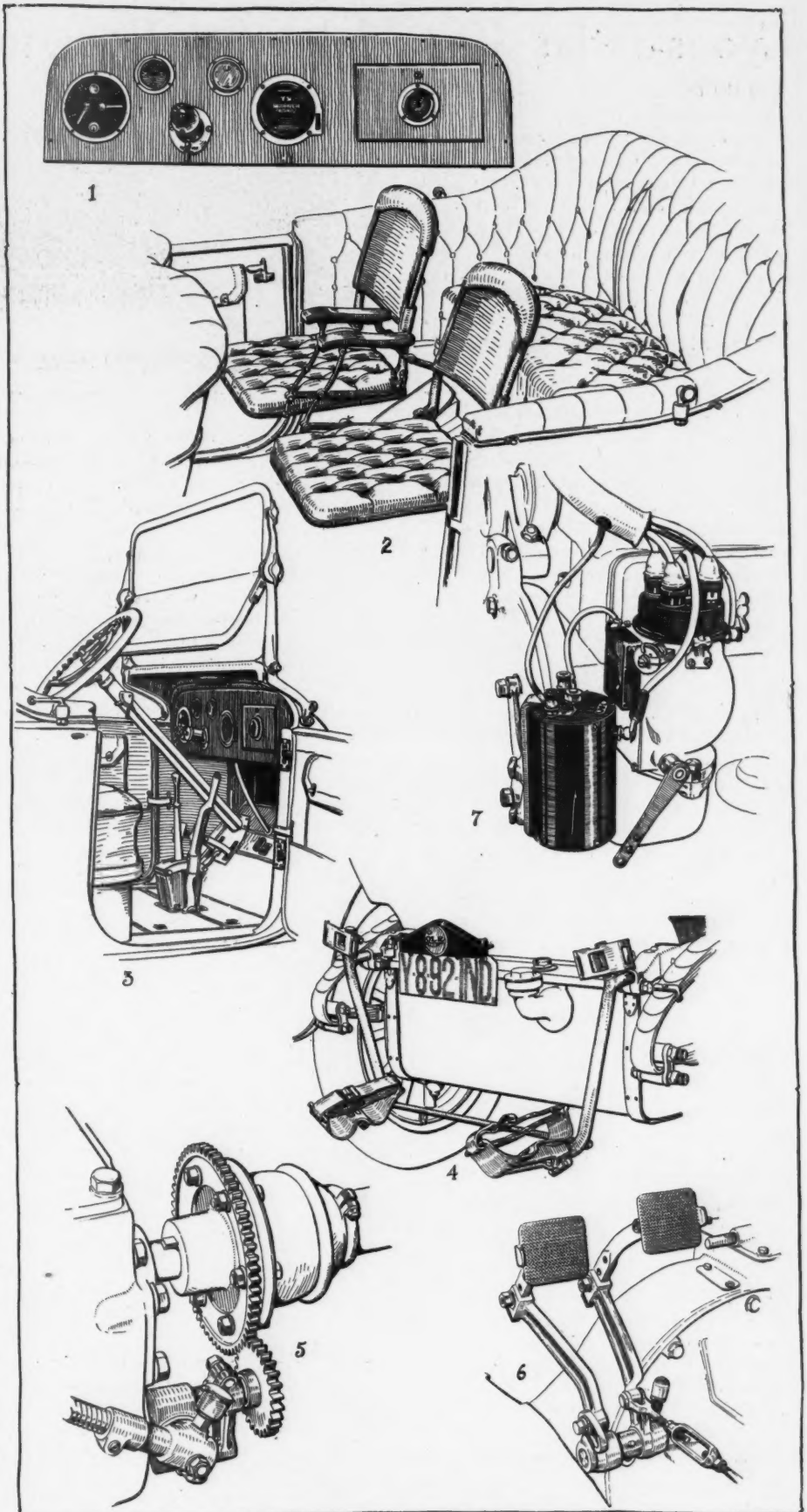
Power is transmitted from the gearset through a drive shaft equipped with two Spicer universals, to a Timken floating axle. Roller bearings are used throughout in this construction. At the ends of the drive shafts are six-jawed clutches which mesh with similar-shaped indentations in the wheel hubs. As in the case of all floating axles, the shafts may be removed without jacking up the car.

In the 1914 Coles the king bolt of the front axle unit is tilted slightly so that a castor steering effect may be obtained.

Two sets of brakes are provided, both acting on the rear wheel drums. These brakes are $2\frac{1}{2}$ inches wide and $15\frac{1}{2}$ inches in diameter and are faced with Autobestine, an asbestos fabric.

The Cole company, it seems, has paid much attention to body appointments and appurtenances, with a view to marketing the car complete in every detail. The body doors are 24 inches wide in front and 26 inches wide in the rear, and the feature of the seven-passenger type is the auxiliary seat arrangement. These seats are fitted with but one arm.

The instrument board, which carries the ignition and lighting switches, hand air pump and gauge, sight feed and clock and speedometer set flush, is located at the rear of the shroud, so that the instruments are within easy reach. A glove and goggle box is in the right side between the instrument board and dash proper.



FEATURES OF THE 1914 COLE

- 1—Instrument board which carries the ignition and lighting switches, air pump and gauge;
- 2—One arm extra seats;
- 3—Left drive center control and view of dash and extension seat;
- 4—Rear tire carriers and gasoline tank arrangement;
- 5—Speedometer driven from gearset shaft;
- 6—Adjustable clutch and brake pedals;
- 7—Six-volt Delco installation which is operated by an extension of the pump shaft

Lyons-Atlas Car Makes Its Bow to Motoring Public

AS the outcome of the purchase of the Atlas Engine Works, of Indianapolis, by the Lyons-Atlas Co., of the same city, the latter concern has announced the introduction to the motoring public of the Lyons-Knight car, which will appear in touring, sedan and berline forms, the chassis to be known as the model K.

Although a Knight engine is used, the manufacturer states that it is different from the Knight engines in either America or Europe, in that it employs features of both types and furthermore has incorporated a number of exclusive improvements.

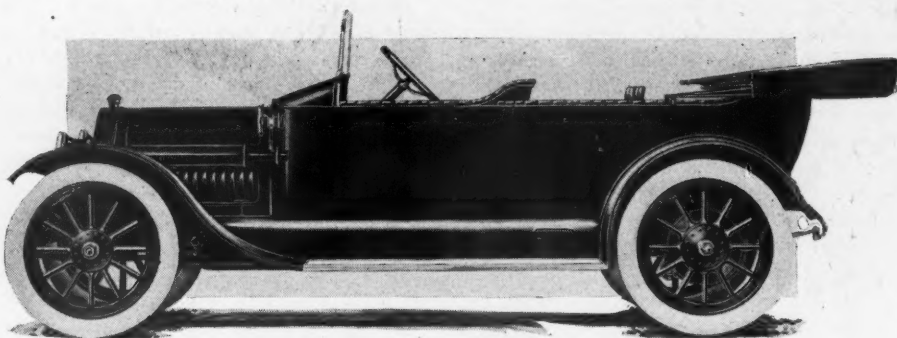
The car is electrically started and lighted, the system in use being the Northeast of the type which comprises a motor-generator, regulator and battery. Besides the starting system, other features are left steer and central control, worm drive and the hydraulic shock absorber, which is attached to the worm gear casing from the center of the rear frame member. This shock absorber is said to reduce sidesway to a minimum and at the same time act as an efficient rebound check.

The single chassis, which is to be marketed for 1914, has a 130-inch wheelbase, and according to present reports the body design will be exclusive. In the case of the sedan and berline bodies the trimming and painting will be done to order, but in the touring cars the stock colors of blue or Brewster green will be used. The feature of the body equipment is the Golde one-man top. This top, instead of being fastened to the side of the front seat, when up, will be attached to the windshield. The latter is built in the company's shops and is of unique construction. Besides the top and windshield the car leaves the factory with every other equipment detail carefully worked out.

The Knight motor used has four cylinders of $4\frac{1}{2}$ -inch bore and $5\frac{1}{2}$ -inch stroke. The sleeve travel in this motor has been increased, which is said to improve the sealing of the ports and give an added increase in power. The walls of the sleeves have been made thicker than is customary, the fillets made larger and the lugs at the bottom made stronger. The inlet ports of the motor are arranged so that the shortest possible carbureter manifold is required, with a view to eliminating fuel condensation, and also making the carbureter more accessible. With the idea of reducing back pressure in the cylinders, the exhaust manifold has been made 3 inches in diameter at the connections to the cylinders.

The crankshaft is supported by five babbit-lined bearings. A centrifugal pump and cellular radiator comprise the cooling system, which has an auxiliary aluminum fan, driven by silent chain from the crankshaft.

The oiling system consists of a plunger pump operated by one of the sleeve eccen-



CHASSIS OF LYONS-KNIGHT MODEL K SEVEN-PASSENGER CAR

tric rods which pumps oil from a reservoir underneath the crankcase to the different bearings of the motor. Before returning to the pump for recirculating, the oil is strained.

Dual ignition is used and it is stated that the type of magneto is such that the car may be throttled down to 5 miles an hour on high without missing. Carburetion is by a double jet carbureter, one jet being used for starting and slow speed work, while the second jet comes into play automatically when higher speeds are attained. An auxiliary air control is supplied on the steering column.

It is stated that 50 brake horsepower may be obtained from this motor at 1,200 revolutions per minute, and that a maximum of 70 horsepower may be had.

The drive from the motor is through a three-plate clutch, the center plate being faced with raybestos. From here the power is transmitted to a three-speed selective gearset which is made a unit with the rear axle. Perhaps one of the most important features of the Lyons-Atlas car is the worm drive to the rear axle. This type has been gaining great favor with engineers, and the Lyons-Atlas is one of the few pleasure cars on the 1914 market equipped with this form of drive.

A floating rear axle has been considered best for this type of car and the ratio between motor and axle is $3\frac{6}{7}$ to 1. At present the Lyons-Atlas will leave the factory with wooden wheels as regular equipment, but wire wheels may be had if desired. In either case the tire size is 37 by 5 inches.

MOTORING IN MEXICO A LUXURY

Chihuahua, Mex., July 20—Motor car riding is an expensive luxury in Chihuahua and other towns and localities of Mexico which have long been cut off from railroad transportation facilities on account of revolutionary activities. At Chihuahua gasoline is selling for 80 cents Mexican money per gallon, which is equivalent to 40 cents United States money. In some other places the fuel is selling for as high as \$1 Mexican money per gallon.

Despite the high cost of running a car, the vehicles are in great demand by for-

eigners and natives who want to be delivered to points on the other side of the international boundary. Machines are being largely used for this purpose by refugees.

Recently Hugh Kendrick and J. B. Hull, Americans, made a motor car journey of 300 miles from Santa Rosalia, this state, to Marfa, Tex., carrying with them the dead body of Henry Burton of Upper Montclair, N. J., who met his death at the hands of a drunken soldier in Santa Rosalia. This long trip was through mountains and over rough roads. It was the only available way left open to get the body out of the country and the faithful friends of the dead man were willing to take the risks and undergo the hardships to accomplish the purpose. A case was reported of C. R. Watson of El Paso and I. S. Gellert of Detroit paying \$500 each to get out of Chihuahua.

WANT DRIVERS' EYES TESTED

Boston, July 19—Eye tests for all drivers of motor cars will be embodied in a bill to be presented the next legislature in Massachusetts, according to citizens who are interested in safe and sane driving. This means that other infirmities will be given attention at that time. Under the present law, there is the question, "Have you any mental or physical incapacity or infirmity of which you are aware?" embodied in every application for a license to drive a motor car, and the answer is always "No."

Dr. Frank E. Draper, former assistant ophthalmic surgeon at the Massachusetts General Hospital at Boston, says there is need of a change.

"Too many blind people are driving motor cars through the streets of our cities," says Dr. Draper. "About 25 per cent of the drivers running machines have defective eyesight. No one should be allowed to run a car who has not had his eyesight tested. Engineers have to have their eyes tested, and yet they do not run big powerful machines on public highways. Because there are many people who are not aware that they have defective vision, everyone running a car should be compelled to submit to an examination."

Details of Benjamin Briscoe's New French Car Announced

PARIS, July 9—Some of the secrecy which surrounded the Briscoe car being built in Europe has now been removed by the appearance of the first models on the road. Last January Benjamin Briscoe registered the Compagnie Briscoe Freres under the French laws and began work on the production of a light car for the American and European market. It was then announced that it was Mr. Briscoe's intention to combine in this new car all the best features to be found in France and America. Judging from the test models now on the road, this has been successfully accomplished. The trial cars have been in constant service now in and around Paris for more than a month and have been examined and commented upon very favorably by European experts.

Although the design of the new Briscoe car does not present any startling departure from standard practice, it embodies all the latest ideas of the French school, and has been laid out with a view to the most economical production on American quantity lines. So far as design is concerned, it is the embodiment of the latest European practice. The motor is a four-cylinder monobloc long-stroke type of very high efficiency, its dimensions being $3\frac{1}{4}$ inches bore and 5.15 inches stroke. On bench tests it is declared to have developed 33 horsepower at 1600 revolutions.

The motor is an L-casting with inclosed valves, integral intake manifold and independent exhaust manifold. It is silent in operations and has a neat, clean-cut appearance. In accordance with the tendency shown at the last European shows, and strengthened during the present season, the motor and gearbox form a unit, the gears providing three-speeds ahead and reverse. The rear axle is of the full floating type and wire wheels are fitted.

In external appearance the car has the features of the highest grade European productions. The bonnet merges gracefully into the scuttle dash carrying the gasoline tank and the fore and aft line of the car is unbroken, while all harshness is removed by carefully rounding off angles.

The only important features in which the car differs from high-grade European productions is in the matter of weight and methods of production. By the use of high-grade material the weight of the car has been kept considerably lower than that of the average European light car. A high-efficiency European motor being fitted, the result is a car with a hill-climbing ability which appears to have surprised French experts. Attention also has been paid to the most economical methods of production and to the greatest ease in assembling. It is intended to be built on the American interchangeable system with jigs and tools for every operation.

Close attention has been paid to the suspension of the car, the services of a European expert being secured in this matter. As high speeds are common around Paris, and road surfaces are rough, this problem has been very closely studied by French designers. The Briscoe makes use of long, broad, thin-leaved semi-elliptical springs front and rear, the result being remarkably easy riding qualities.

No definite announcement has yet been made regarding the marketing of the Briscoe cars. As application has been made for a central stand in the Grand Palais, Paris, for the first European show next October, it can be assumed that they will make their bow to the public on that occasion. It is stated that arrangements are almost completed for the production of these cars in Europe in large quantities for the 1914 season. Arrangements are

also about to be made for the manufacturing of sets in the United States on a fairly large scale, but Mr. Briscoe states that it is not his intention to seek a mammoth output the first year the car is manufactured.

Close attention will be paid to quality, inspection, and test and the output increased without losing sight of these requirements. The first cars now on the road are touring models, but it is understood that runabouts and closed cars will also be manufactured. The price has not been announced; it is understood to be less than \$1,000 for the full touring model. The present headquarters of the Briscoe company are at Rue du Point du Jour, Billancourt, Seine, which is one of the important motor suburbs of Paris.

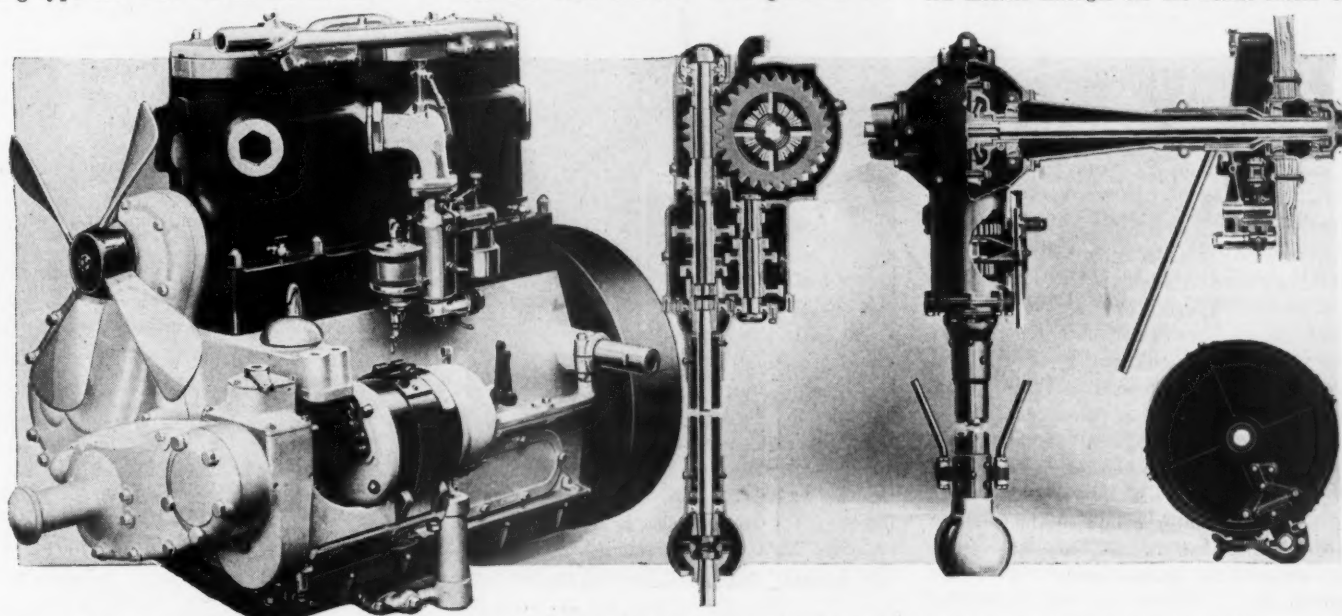
RULING IN RAJAH PLUG CASE

Washington, D. C., July 19—"Neither the tariff act nor the trade-mark statute contains any express provision according to which the employment of 'Rajah' printed on a porcelain spark plug can be taken to fix an exemption in favor of such a ware as against similar ware printed with similar names in common use. The spark plugs are dutiable as assessed under paragraph 93, tariff act of 1909."

This is the decision of the United States court of customs appeals in the case of Richard & Co., vs. United States. In its decision, rendered by Judge Martin, the court affirmed the decision of the board of general appraisers.

Additions to Lozier Staff

Detroit, Mich., July 21.—Frank H. Smith, formerly of the Studebaker and Maxwell companies, has joined the sales staff of the Lozier Motor Co. under Sales Manager Paul Smith. Frank Smith formerly was assistant to Paul Smith when the latter was sales manager of the Studebaker Corp. Frank Smith will act as special traveling representative for the Lozier company, working out of Detroit. H. C. Whitney has accepted the position of southern district manager for the Lozier Motor Co.



LYONS-KNIGHT MOTOR, SHOWING LOCATION OF CARBURETOR AND STARTER AND REAR SYSTEM WITH CROSS SECTION OF WORM GEAR DRIVE AND TRANSMISSION



CAT &
DOG
MOTOR
PLUG

The Motorist's Kindergarten



EDITOR'S NOTE—Motor Age is publishing in this department a series of non-technical explanations of the various parts of motor cars for the benefit of the reader who knows nothing about them. The subjects will be dealt with in the most elementary manner, so that the series when completed will form a simple elucidation of the car. The first article appeared October 10, 1912.

PREVIOUS Kindergarten articles have described the motor and how it turns the clutch and how it is attached to the drive shaft or chain and how that member turns the rear wheels. But as the rear wheels revolve they must push the rest of the car along and if the rest of the car is not fastened to the axles the wheels will go along the road, leaving the rest of the car behind.

To make this clear: The frame, as we know, supports the motor clutch and gearset, and the springs are attached to the frame. The front and rear axles are fastened to the springs by what are called spring clips. If the springs were not fastened and the wheels given a sudden push, then the wheels would move away from the frame. But by fastening the springs to the axles any revolution of the rear wheels pushes the car along by means of the springs.

In a number of instances springs alone are not sufficient to push the car along, so designers have devised other members. These are called torsion rods, radius rods and torsion tubes. These members in conjunction with the springs push the car along the road, and they do a little more; by keeping the rear axle a fixed distance from the clutch and gearset. It is clear that if the rear axle moved away from and toward the gearset or clutch the driving gears would drop out of mesh and then come together, which would mean disaster for the gears. Also, when the brakes are applied on the rear wheels the tendency is for the rear wheels and the rear axle to stop and the frame and the rest of the car to go ahead, due to inertia.

An Analogy Offered

The same action would result if one were to carry a pail on his head and then run along balancing the pail. A sudden stop would mean that the pail would fall, but if the pail were fastened rigidly to the head it would remain so, even if the person stopped suddenly. So with the motor car. The braking of the rear wheels tends to stop them, therefore the rest of the car must be rigidly fastened in order to stop also.

It is evident that the springs of a motor car act as a means of pushing the car along and the action of the other members mentioned and their location on the chassis will now be discussed. In Fig 77 is shown the positions these members take on the chassis, but it should not be understood that every car has all these members attached, for such is not the case. Some

Method of Car Propulsion

makers use only springs, while others employ springs and radius rods, and again others use springs and a torsion tube. Various combinations of these members are employed on the cars of today.

Torsion Tube Around Drive Shaft

Referring to the illustration, it will be noted that the torsion tube surrounds the propeller or drive shaft. The forward end of this tube is free, that is, it fits lightly into a housing, which is part of the gearset housing usually. The rear end of this tube, however, is fastened by bolts to the rear axle housing. When the rear wheels move the torsion tube tends to hold back the axle and thus keep it a fixed distance from the rest of the car and at the same time it helps to push the car along. Of course, the springs are helping also. In the Hupmobile 20 use is made of the torsion tube, the front end of which forms a ball joint. Thus, the torsion tube may move up and down, but not sideways. If it did move sideways it would tear itself

away from the fastenings at the rear axle.

In the same illustration the position of the torsion rod is shown. This is a solid bar usually fastened at one end to the rear axle housing and at the other end to a frame cross-member. But the fastening to the cross-member is by a spring and bolt, so that the rod may move up and down with the movement of the springs, but not sideways. It is clear that this rod will keep the rear axle a predetermined distance from the clutch and gearset, but will itself move up and down with spring movement. This type of distance rod, as it is called sometimes, is used on the Packard, Cole, Colby, Premier and other makes of cars.

Sometimes the torsion rod takes the form of a V-shaped member and in this case it is called a torsion member. The reason it is used is purely one of opinion. That is, the manufacturer who uses it believes it the most efficient means of pushing the car forward.

Radius Rods and Their Action

Radius rods, as will be noted from the illustration on this page, come in pairs, one on each side of the chassis. They are fastened at one end to the rear axle housing and at the other to the frame. This type was in use on most of the chain-driven cars on the market some time ago, and they did more than push the car, they prevented the chains from tightening and loosening with every movement of the rear axle. The Packard car employs radius rods also in conjunction with the torsion rod and springs.

Below are four cars using different methods of propulsion:

Springs only—Pullman, S. G. V., Pater-son, Moon.

Torsion tube—Cutting, Flanders, Duryea, Mitchell.

Torsion rod—Apperson, Chalmers, Colby, Cole.

Radius rods—Abbott, Alco, Auburn, Havers.

As mentioned in this article the springs are used partly to push the car along, but it should not be taken that the springs do only this work, for we all know that without springs riding in a motor car would not be at all pleasant. The springs cushion the car and in conjunction with the tires make passenger carrying possible. There are a number of different types of springs on the market today and their advantages and disadvantages together with their appearance will be taken up in this department in an early issue.

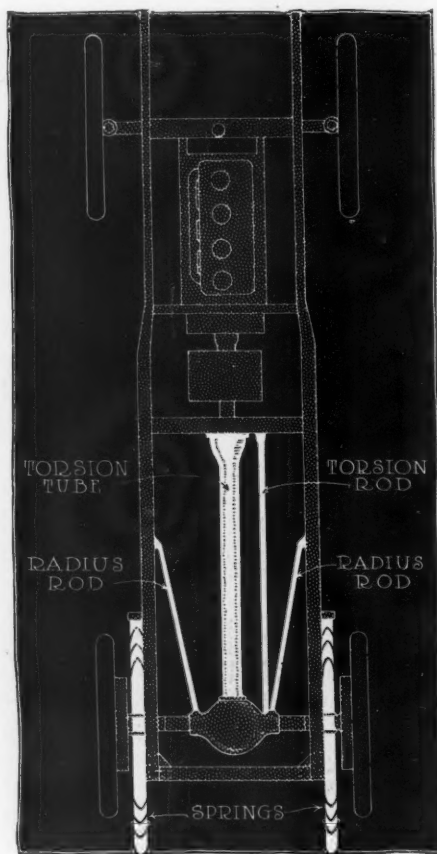
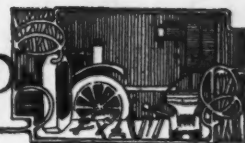


FIG. 77—SHOWING THE POSITION OF THE TORSION TUBE, TORSION ROD AND RADIUS RODS



The Motor Car Repair Shop



Illuminating the Workbench

It is quite safe to state that in most of the motor car agency repairshops, the illumination of the workbenches is inadequate; and the repairmen in these shops are expected to do good work in a poor light, which, of course, often is impossible. Much of the lack of proper lighting facilities is due to poor arrangement rather than the absence of suitable lamps; and a little consideration of this point, on the part of the branch manager or shop foreman, may bring about a generous increase in the quality of the workmanship and the general efficiency of the shop; whilst in many cases, even a saving in the electric light bill may be obtained.

In Fig. 1 is shown how one repairshop has managed to improve the illumination of a workbench considerably, and at no great expense. Originally this shop, which is located directly behind a motor car sales-room and has a comparatively high ceiling, was illuminated by two clusters of three lamps each. These were attached in suitable positions to the ceiling, and served to illuminate the entire shop fairly well enough to move cars about therein, etc., but for detail operations a better light was essential and this was provided by means of a long drop cord, attached to a socket of one of the clusters. This lamp was hung over the workbench, held by a nail in the wall, when bench work was being done; and arranged as conveniently as possible about a car or chassis when the most important work was being done thereon. If one man needed the light on a car or chassis while another needed it at the bench, either one or the other would wait, or work as well as possible in the feeble light of the distant overhead clusters. This, of course, caused a loss of much time, by no means promoted better workmanship, and the constant breaking of lamps, sockets and wires of the extension cord, together with the large number of fuses burnt out, comprised an item of ex-

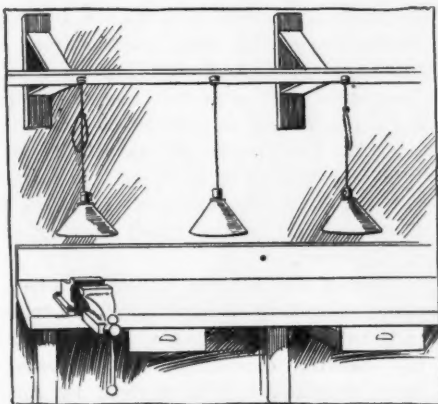


FIG. 1—IMPROVING WORK BENCH ILLUMINATION

Improving Bench Illumination

pense which in 6 months would have paid for the installment and maintenance of a most excellent equipment.

As shown in the illustration, an overhead rail of wood for the direct support of the electric wires and lamps, was substantially suspended from equally substantial and simple wooden brackets. This extension allows the lamps to hang in a most convenient position for the workmen when at the bench, and as the connections of the lamp cords at the top or rail also are of the plug-and-socket type, the cords may readily be removed, and the lamps, one or all, attached directly to the overhead rail, thereby giving a less intense but greater diffusion of light.

These three lamps have effected a vast improvement and at the same time greatly reduced the cost of illumination; for, whereas, the two ceiling clusters were previously in continual use, one has been done away with entirely, whilst the other is only employed when illumination of the entire shop is necessary. As the repair operations are centered on one or two cars, which are conveniently near the workbench, only two or three of the bench lamps are in continual use. Generally, one lamp, the center one, has its cord removed and the lamp attached direct to the rail; the one over the vise is left as shown, and the one at the extreme right in the illustration is provided with a long extension cord which permits the lamp to be moved about the cars or chassis under repair.

It might be well to mention that to keep this long extension cord off the floor as much as possible a curtain cord running through a pulley attached to the ceiling is provided; one end being attached to the light cord and the other to a cleat on the wall conveniently arranged.

Turn Table for Re-Babbiting Bearings

Inasmuch as most motor cars nowadays have their motor bearings lined with babbitt an illustration and description of a novel device for relining bearing bronzes with babbitt metal may be of interest, and this device as shown in the illustration Fig. 2, comprises a turntable of simple metal construction, having on the top surface of the revolving portion, a series of cores suitably arranged near its circumference. The bearing bronzes are fitted around these cores, and secured and packed at the bottom with a roll of fire clay.

A receptacle suitably mounted over a gas flame contains the molten babbitt metal. This has an outlet near the bottom with a nozzle so arranged that when a little gate valve is opened, the molten metal will flow into the bearing on the turntable below.

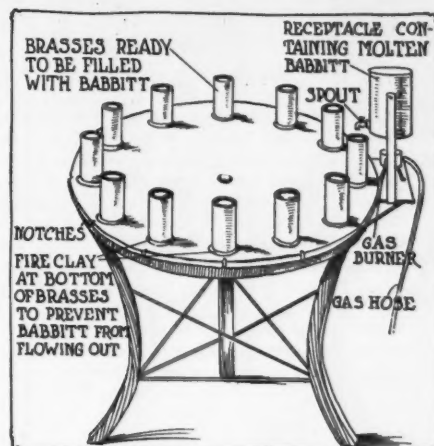


FIG. 2—TURNTABLE FOR A RE-BABBITTING BEARINGS

There is a little notch in the edge of the turntable opposite each bearing core; and a little stationary spring-operated dog registers with these notches so that the stream of metal from the nozzle of the receptacle may be accurately directed into the annular space between the bearing bronze and the core.

Thus, to rebabbit one or two sets of bronzes, one has but to attach them to the turntable around the cores, a permanent ring being provided to facilitate centering them, then secure them in place and at the same time close the crevice at the bottom of the bronzes, with plastic fireclay rolled in the form of a sausage. This prevents the molten babbitt metal from flowing out at the bottom. When all the bearings are thus arranged, one has but to move one bearing into position, let the babbitt flow into it, and when generously full to allow for shrinkage, shut off the stream of molten metal, turn the next bearing into position and repeat the operation. When the last one has been filled, the first will be sufficiently cool to remove from the turntable.

Getting Flame Without a Match

In the repair shop and on the road one often is required to have a flame and finds no matches available. Should one happen to be out in the country and in the dark, usefulness of the following means of obtaining an excellent flame will be appreciated. It consists in winding a small bunch of waste or a piece of cloth around a stick or the end of a tool, dipping it into the gasoline tank and then lighting the torch thus manufactured by holding it in the path of the sparks that jump between the end of a disconnected cable and the sparkplug terminal.

Sometimes a spark may be made to shoot from the pet-cocks of the cylinder by racing the motor.

Diagnosing the Ills of the Pneumatic Inflation, Ailments and Care of Tires

By Harry A. Tarantous

WHEN you have no appetite or are suffering from indigestion, you consult a physician. He diagnoses your ailment as mistreatment of the stomach. You regard such a diagnosis as correct and accept the remedy that he offers. You pay him a fee for his services, either on the spot or ultimately if you are honest.

When the tire on your motor car is ailing you call on the tire adjuster and register what you consider a righteous protest. When he diagnoses the tire disease as "it has run out of line" or "it has been running under-inflated" you lose your temper, perhaps make unpleasant remarks and mentally condemn him as a double-cross artist. Yet ninety-nine times out of 100 he is right, as correct in his diagnosis as the physician to whom you pay a fee for relief from physical pain.

The adjuster is the tire doctor. No one knows better than he what has brought a casing or tube back for adjustment. A glance at a tire that the owner states has run only 1,000 miles and which through defect has worn through the tread and a portion of the fabric, tells the adjuster a story, and a true story at that. "Out of alignment," he may say. He knows, for he can see. It is his business to prescribe for ailing tires.

There are nine visible ailments to which a tire is heir and a tenth that can be seen only when the casing is removed from the wheel, according to the diagnosis of the B. F. Goodrich Co., Akron, O. The nine visible ailments are due to under-inflation, faulty wheel alignment, neglected cuts, running in car tracks, excessive skidding, neglected repairs, injury by chains, running in ruts and the use of protectors. The invisible ailment is called a bruise. All ten diseases can be cured either by the application of simple home remedies or the use of caution in operating the motor car.



Results of Under Inflation

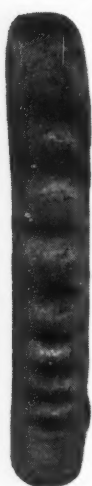


Fig. 1

UNDER-INFLATION means that the tire has been run with too little air in the tube. By too little is meant under the pressure specified by the tire company for that particular size of tire. Excessive overloading may give the same result. How does a tire look that has been run under-inflated? The tread has been separated from the fabric and from the outside the tire appears like a mass of interconnected hilly blisters.

An undue amount of heat is generated in an under-inflated tire, which causes the cement between the tread and fabric and also the layers of fabric to loosen its hold. Not all under-inflated tires look the same, for the length of time a tire has been run with insufficient air pressure determines the conditions of the tread and fabric.

Owners have stated that in the summer a tire should not be inflated to pressure designated by the maker, because the heat generated in the tire will soon cause the air in the tire to expand and bring the pressure to the required amount. This is true so far as it goes. The tire will gain in pressure. But think of the strain while it is gaining that pressure? It may blow out while waiting for expansion due to a temperature increase. It wears more rapidly. Then again, the car may stop and the tire cool, in which case the pressure drops and the tire is again under-inflated.

In a recent test a tire was placed on a wheel with but half the requisite inflation. This was in the summer, and a run of several miles was made, with the result that the tire gained 28 pounds in pressure,

Editor's Note—Motor Age acknowledges the courtesy of the B. F. Goodrich Co. in loaning the photographs used to illustrate this article.

according to a pressure gauge. In a second run the tire was inflated to its proper pressure and the same run made on an equally hot day with the result that the tire gained but 3 pounds in pressure. This goes to show that so much heat was generated in the first trial that the air expanded greatly, whereas in the second case comparatively little heat was generated. In the first case the heat meant excessive tire wear and the possibility of the tread separating from the fabric, or a blow out.

Besides the heat generated, causing the fabric to separate from the tread, the condition is aggravated by the continual expansion and compression of the walls of the tire. This not only causes fabric separation but in a number of instances fabric breaks, and fabric breaks means a blowout in a short time.

The causes and effects of running under-inflated tires are known and the remedy is a simple one—use a tire gauge. No one can tell by glancing at a tire whether it is properly inflated; it may stand round, etc., but still be under-inflated. Reliable gauges may be bought for \$1 and there seems no reason why guessing should continue, when assurance is cheap comparatively.

Each maker issues a list of the pressures to which the different-sized tires are to be inflated and if the utmost tire mileage is to be expected these pressures should be maintained.

Tire manufacturers say that running a tire over the specified pressure will not

injure it, for if designed for, say, 80 pounds, the tire really can stand much more. This does not mean that owners should pump the tires beyond the given pressure, but it does mean that they should not be afraid to pump slightly over the stated amount. Tire life will be increased if owners remember to use a gauge once each week to see if the tire pressure is as recommended.

Out of Alignment

Besides under-inflation just discussed another common tire ailment is caused by running a tire on a wheel that is out of alignment. Such a wheel moves sideways at the same time it revolves, with the result that the tread appearance would show if the tire face. The inevitable result is a worn tread in a short space of time. The same tread appearance would show if the tire were held against an emery wheel. The tread in either case will be worn all around and the fabric show perhaps. When the wheel wobbles the same action results, but the surface appearance of the tire is somewhat different. In this case the tread is not worn all around, but instead shows the fabric only in spots. Sometimes the condition hardly is noticeable. Scrutinizing the tire closely will reveal the fact that it has been scraped, and no matter how slight the roughness of the tread, it is due usually to the wheel running out of alignment.

When a tire is upon a wheel which is not running true, the car should be taken to the nearest service station and the steering connections and necessary parts examined. It is advised by some that once a month, especially in new cars, the wheels should be measured, for some-



Fig. 2

Fig. 1—Note the interconnected blisters on this tire which has been run under-inflated

Fig. 2—A wheel out of alignment will give the tire the appearance shown



Fig. 3

times the degree of out of alignment is hardly perceptible. Rear wheels are not as apt to become out of line as front wheels, for these do the steering.

Under-inflation and out of alignment are common tire diseases and are receiving more attention from owners each year, but the cut-tread problem is another which fast is becoming interesting.

Cuts in the Tread

When a little cut appears on the tread of a tire, what matters it? Such is the idea gained by a number of motorists. A cut on the tread of a tire is just as serious as a cut on a man's hand. In the latter case blood poisoning may result and in the former, tire poisoning. And by tire poisoning is meant that the tread becomes blistered or sickly-looking, we might say. A cut through the tread of a tire is an invitation for dirt and water to enter. The dirt enters and forms itself into a ball and due to the rotary motion of the tire, the ball works its way between tread and fabric, thus separating the two. Suppose it rains? Then water, too, enters and becomes acquainted with the fabric. And if there is one thing detrimental to fabric life, it is water. Water tends to rot the fabric, first one ply, then another and soon the last ply. When the last ply breaks the inner tube usually follows.

If small surface cuts lead to deep tread cuts and deep tread cuts bring on fabric separation and the latter blow outs, it follows that owners should repair the small surface cuts as soon as they appear. But motorists in general, are drones when it comes to repairing these cuts. It is such a simple operation and yet neglected. A cut on the tread should be opened by prying with two blunt pieces of wood, a knife carefully used, or with the repair pliers. With the cut open gasoline should

be squirted into the cut to clean out the dirt. The cut should be made perfectly clean and then a little air drying rubber cement applied. After the first coating has dried a second should be applied. If mastic is at hand a little should be forced into the cut. If no mastic is obtainable a few more coats of the cement will help matters.

Running Wheels in Tracks

Owners enjoy running in the car tracks when the street is paved with cobble stones, but if it were known that this causes the tires to wear rapidly, no doubt the practice would cease.

Running a car in car tracks will cause the sides of the tires to become worn, a continuation of the practice causing the fabric to show. Often blisters evidence themselves.

Skidding Causes Tire Wear

Skidding, of course, may be due to a number of things, but the chief cause of tire wear from skidding, is due to sudden application of the brakes, especially on country roads. We all know that sand will cut and country roads contain a bit of sand. When the brakes are applied suddenly and the wheels slide, even though it be slightly, the sand cuts into the tread. On city pavements, too, the skidding causes the tires to wear. Friction causes wear and tire skidding on a city pavement is equivalent to rubbing the tire against a rough substance, with the result that the tread will wear rapidly and usually in spots.

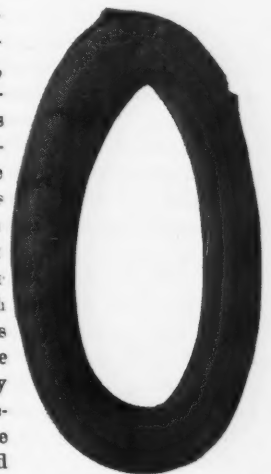
Neglect of Tread Repairs

The owner will notice a cut through the tread and close observation reveals the fact that the fabric, too, is injured slightly. The very first thought with some is the insertion of a blowout patch. This is exactly the thing to do if the car is distant from a tire repair shop, or if no tire is at hand to take the place of the injured one. The proper thing to do if the tire can be replaced readily with a new one, is to have the fabric break repaired and the tread vulcanized immediately. The reason this is not done is because the patch holds out for a time and the break forgotten, and nothing is said or done until the tire blows out. It should not be taken that the insertion of a patch hastens the blow out. However, if the break is through the fabric and the patch wedges between the two parts of the fabric, then is the blow out hastened, because the patch may be nipped by the sides of the fabric.

What shall I do if a cut penetrates the tread? Have it vulcanized, even if the cut is only $\frac{1}{2}$ inch long. This may seem extravagant at first, but the extra tire mileage gained will more than make up



Result of a neglected repair showing what happened when inside patch was wrongly applied



Chains fastened too tightly cut the tread

Use of Anti-Skid Chains

Does the anti-skid chain injure tires? A big tire manufacturer says they do and the makers of chains says they do not. In both cases certain suppositions are made, but the very fact that tires show wear from chains leads us to believe that the use of chains does injure tires to a certain extent when the chains are applied



Car track running gives the result shown at left—Skidding excessively caused the wear in that shown at the right



How a tire appears that has run continually in ruts

Fig. 3—Small tread cuts will soon cause blisters to form

too loosely or too tightly or run continually on hard pavement.

The continued use of chains will cause the tread to be cut through at the point of contact of the cross pieces of the chain. Sometimes the fabric shows. In a number of instances the tread is separated from the fabric, showing blisters, and the impressions of the chain links visible. Tight chains will do more damage than those permitted to work around the tire, for in the latter case the stress is applied at various points, whereas in the former the action is local. It remains for the owner to use the chains only when necessary and remove them as soon as possible.

Tire that Has Run in Ruts

Another common tire ailment is that due to running the car in wheel tracks. All motorists know that in the early spring and fall after a rain, the wheel tracks and ruts on the country roads harden and a number of high and low uneven surfaces present themselves. The running in and out of these indentations is a common cause of the side of the tread wearing rapidly, the tire being designated as rut worn. Close curb driving is practiced sometimes with the result that the sides of the tire are scraped and sometimes pinched by the curb, giving the same result as running in ruts. A prominent tire manufacturer draws a good analogy. He advises walking down the street taking each step close to the curb and allowing the upper of the shoes to rub against the curb stone. He asks, "How long would the upper of the shoe last and yet the sole be unaffected?" So with a tire. The sides become worn but the road contact surface unaffected.

Injury Due to Tire Protectors

Now we come to the use of tire accessories. The B. F. Goodrich Co. states that nothing will injure new tires more than the use of inside protectors. These appliances are recommended only for tires that have seemingly outlived their usefulness and the inside protector then tends to prolong life. Tires are made to be operated successfully under certain conditions and to the use of inside protectors on new tires increases the number of piles of fabric with the result that an undue amount of heat is generated, it is claimed. The heat causes the tire to wear rapidly, be less resilient and also weakens the adhesive qualities of the rub-



This tire has been run with a protector. Note the condition of the inside of the casing

ber between the various plies of fabric with the result that blisters show.

Stone Bruises Are Common

It seems to be a difficult matter for a tire adjuster to convince an owner that a tire has blown out because of a stone bruise or similar shock. This condition exists because of ignorance on the part of the owner. Should a tire be run over a stone, the fabric may be broken. Hitting a curb stone sharply at right angles, will sometimes give the same result. These



Here is a tire which has been bruised. Note the inside fabric break yet no defect is visible on the outside marked with an X

Manufacturers' Communications

The Advantages of Large Wheels

INDIANAPOLIS, Ind.—Editor Motor Age —Advantages of large diameter wheels are self-evident. Strange as it may seem, the only question ever raised is the one as to tire cost. The advantages of large-diameter tires are so fully appreciated by the tire manufacturers that they are encouraging the use of large-diameter tires by making a concession in the price. By referring to a price list of any of the large tire manufacturers, it will be found that the price of a 41 by 4½-inch casing is less than the price of a 36 by 5. This hardly seems reasonable to the casual observer. The 41 by 4½-inch casing must contain a greater amount of rubber and canvas, and certainly it takes a greater length of time to build the body of the tire, owing to the larger diameter. The fact that the difference in the list price is in favor of 41-inch tires can only be explained in that the tire manufacturer is endeavoring to encourage the use of large-diameter tires, no doubt reasoning with his own mind that the large wheel is the only solution of the tire problem.

Perfecting the pneumatic tire has not progressed with the rapid development of

things may cause the fabric to break and at the same time show no visible fracture. The tread being soft resists the blow unharmed, but the fabric gives way to the shock. Most motorists know what a cracked fabric means—blow out in a short while. If not, then the cracked fabric may pinch the inner tube and cause deflation.

When Running Properly

From the foregoing it would seem impossible almost to operate tires as they should be, but the use of a gauge each week, together with inspection and immediate repairs of tires and also careful driving will cause tires to operate properly. If the tread is wearing smoothly and evenly all around, then the tire is running right. By smoothly is meant, that the tread does not appear as if it were scraped. Of course, sand sometimes causes a rough surface to appear, but then one knows he has been running through sand and the roughness caused by it will disappear in a short while and the tire will again show a smooth surface. The wear should not be uneven. There should be no low spots here and there. If there are such spots see if the wheel wobbles. If the wheels are lined up and the tire pressure right and the tire wears evenly and smoothly but very rapidly, see the maker of the tire, for it is possible that the tire casing is defective.

the motor. In fact, the pneumatic tire is the weak point in the construction of the car. Anything which the car manufacturer can do to help overcome the one weak point which has had the greatest retarding effect and the one thing which has been the source of the greatest expense in the maintenance of a car, certainly deserves the attention of the progressive designer.

The theoretical reason why the 41-inch tire has a much longer life than tires of a smaller diameter is that the angle formed by that portion of the circumference of the tire where it makes contact with the road is smaller. As a result, an obstruction in the road of a given height being passed over by the larger wheel, does not cause the wheel to rise so abruptly. In other words, the greater this angle, the more quickly the wheel is called upon to rise. The blow of the contact of this obstruction consequently is greater. Owing to the increased radius of the arc at that portion of the tire which is in contact with the ground, a great many small depressions in the road can be bridged. If the wheel was to drop into these depressions the fall

would result in practically the same kind of a blow being applied to the tire as if it were passing over an obstruction which stands above the surface of the road. The greater number of these small, but nevertheless telling, blows that can be overcome will not only prolong the life of the tires, but will also result in the entire mechanism of the car being greatly protected.

Vibration in itself can in a way be compared with a great many blows of greater or less magnitude being applied with greater or less rapidity. The blow of a hammer, for instance, no matter how small it may be, if kept up sufficiently long will destroy the best piece of armor plate. Vibration is the greatest enemy the motor car of today has to contend with. The large wheels not only lengthen the life of the tires, but prolong the life of the rest of the car as well. In early construction this important factor of vibration was not as fully appreciated as it is at the present time. The early builder found that certain parts of his car were failing. In his early calculations the part may have been designed with the factor of safety in view; however, the all-important question of vibration was overlooked. This problem of vibration has created the demand for the alloyed steels which enter into the construction of the car of to-day to such an extent.

Another reason why the large-diameter tire will give a greater mileage is that the length of the cord which is formed by the surface of the road depressing the periphery of the tire is much greater. The increased length of the contact with the road not only has its advantage in the surface wear of the tire, but also plays an important part in the ability of the tire to withstand the enormous strains which are applied in the driving and the retarding of the car to that portion of the tire which is in contact with the ground. The reason for this is that there is a greater per cent of the periphery of the tire which is carrying the load, and owing to the load being applied over a greater portion of the tire, the strain is more equally distributed.

The ideal condition as far as the load being applied to tires is concerned, would be to distribute the load throughout the whole circumference. This, however, is impossible; consequently, anything that can be done to increase the amount of the surface of the tire which is carrying the load will tend to improve its wearing quality. The most important reason why manufacturers have been averse to the application of the large-diameter wheels is that when these wheels are used in the construction of a car having an overslung frame, owing to the assembly problems which are encountered, the car by necessity is decidedly higher.

From the viewpoint of safety as well as the idea the buying public has to-day, a car must be low in order to be acceptable. The thing which determines how low a car can be built is the road clearance. In

the construction of our underslung cars we have four advantages: large wheels; a maximum road clearance; and although the maximum prevails as to these two important questions, the total assembly of the mass of the car is well down, for instance, the greatest vertical height of our Traveler is 4½ feet; the center of gravity of the mass being decidedly low. The combination of these four very important details results in a car having the greatest possible amount of stability on the road.

In traveling around a corner at a high rate of speed in the ordinary overslung car, the driver experiences a sensation as though the car were trying to turn over. The reason for this is that the center of gravity of the car is so high that the springs are called on to carry a much greater additional vertical load, owing to the fact that the mass of this load is so much higher than the horizontal plane in which the springs lie. As a result, the outside springs deflect or flatten out and the

frame of the chassis is thrown on a decided angle with the wheel centers. This change in the plane of the frame is the thing which causes the sensation of overturning.

In our underslung construction, although the corner might be turned at a much higher rate of speed, there is not the faintest indication of this sensation of the car turning over. The reason for this is that in the construction of the car we have overcome the causes as outlined above. The springs, being so nearly in the center of the mass of the car that the effort applied by the centrifugal force caused by the change in the direction of the car, are so near in line with the horizontal center of the mass, that instead of being deflected vertically, the load is applied to the side of the springs. As it is impossible to bend a spring sidewise, the frame of the car is held in horizontal position, entirely relieving any sensation of overturning.—V. A. Longaker, General Manager, American Motors Co.

The Motorists' Bookman

Blue Book for New England

COVERING New England and eastern Canada, Volume 2 of the Automobile Blue Book completes the 1913 series of these most comprehensive motorists' guides. Practically this entire section, encompassing so much exceptionally fine touring ground, has been routed afresh. Therefore, the new volume gives not only any new routes opened up, but the last word on routes heretofore outlined.

The maps are exceptionally good, the general maps being almost doubled in size, and a number of pilot maps introduced which are made from government surveys. Practically all city maps have been redrawn. Portions so thickly netted with roads as the vicinity of New York and Boston are shown in separate maps with page reference to them given on the larger map.

Nova Scotia is brought into greater prominence than formerly, as this Canadian peninsula has become a favorite touring spot with eastern motorists, and most deservedly so, with its varied scenery and fine roads that are to be found from Sydney to Yarmouth.

Volume 2 may be had at the uniform price of \$2.50 from the Automobile Blue Book Co., New York or Chicago.

Motoring Map of British Isles

The map of the British Isles is the latest in the Bartholomew series. These maps are made on a scale of ½ inch to the mile, are mounted on cloth and dissected and fold into a size that permits carrying in the pocket. The land is colored according to the contours of altitude; counties are named and their boundaries defined; roadside inns and hotels are indi-

cated as also are fishing streams, lochs, woods, forests and antiquities. The first-class roads are colored red in order to distinguish them from secondary and indifferent highways for motoring. In addition to the map of the British isles which sells for 5 shillings, two others have been published by John Bartholomew & Co. of Edinburgh, a contour map of central Europe and a contour map of France.

Coast and Countryside—Southern England

Another Homeland reference book, "Southern England, Coast and Countryside," has been added to this charming series. Whether the reader be a motorist, a traveler by rail, or one of the largest class—the stay-at-home traveler—these delightfully written, daintily illustrated little volumes will be found of unusual interest. An attractive feature of this particular volume is the chapter on the cathedrals of southern England, and another is the one on the golf courses. The price is only 25 cents. Published by the Homeland Association, Ltd., London, Eng.

Ford Reference Book

A book dealing with the care and repair of Ford cars is being offered to Ford owners for \$1 by the Ford Reference Book Co., New York. Although there are a number of useful hints on the care of Ford cars, the author recommends a certain spark plug pump, vulcanizer and even varnish. These may be efficient, but the reader will get the idea that these are the best procurable for Ford cars. The book takes up characteristic performances of the Ford car with certain ailments. These ailments are explained and methods given for their correction so that the owner may understand them easily.

The Accessory Corner

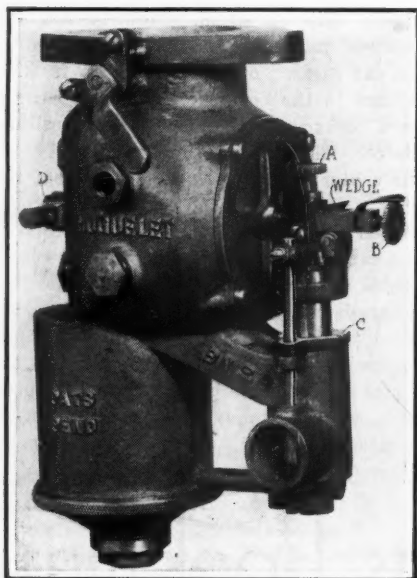


FIG. 1—HUGUELET CARBURETER

This instrument is said to feed a perfect mixture at all speeds

McNutt Gasoline Tank Plug

A SAFETY device for gasoline tanks is being marketed by the McNutt Non-Explosive Can Co., New York, at \$1.50. This plug not only warns one that the tank is not safe, but it will at the same time prevent the tank from exploding. The plug is shown in Fig. 2. As soon as the pressure in the tank becomes excessive a loud whistling sound is emitted, and at the same time internal pressure is lessened. The plug contains a fusible seat which melts at 300 degrees Fahrenheit, and at this point the entire valve will blow out, leaving a clear opening into the tank, thus preventing bursting. A fire screen at the bottom of the plug prevents the flame from back drafting into the tank.

Huguelet Carbureter

A carbureter which is said to feed the proper mixture of gasoline and air regardless of motor speed has been announced by Huguelet Bros., Chicago. This carbureter has a direct mechanical connection between the air intake and the spray nozzle. That is, as soon as the throttle is opened and the auxiliary air valve pushed in, the stem of the auxiliary air valve indirectly opens the spray nozzle. Thus for every movement of the air valve there is a corresponding movement of the spray nozzle.

The carbureter is shown in Fig. 1 with the principal parts lettered. It will be noticed the auxiliary air valve lies horizontally and attached to the stem is a rod upon which is a wedge. As the air valve opens or goes inward the wedge moves inward. In this way it lifts the portion A, which is the end of the spray nozzle.

The point at which the wedge comes into action is regulated by the nut. That lettered B is the high-speed adjustment giving more gas when turned to the right and less when turned to the left.

The auxiliary air valve adjustment is shown at D and the dash air control at C. Another feature of this carbureter is that the closing of the air valve floods the carbureter at the same time.

The Huguelet carbureter is being mar-

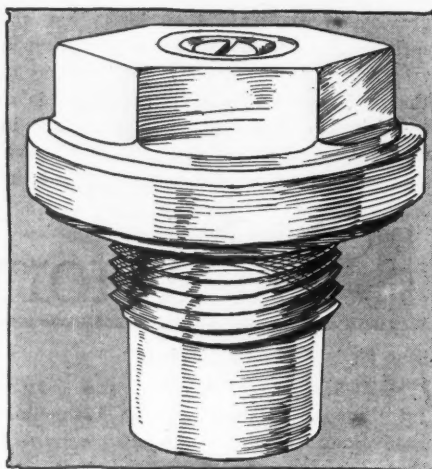


FIG. 2—McNUTT SAFETY PLUG

The plug gives a loud whistling sound when tank pressure is excessive

keted in two forms, one with and the other without a waterjacket. For the former the prices range from \$29 for the 1½-inch to \$44 for the 2-inch, and for the latter from \$21 for the 1-inch to \$27.50 for the 1½-inch. A special Ford carbureter is offered also.

New Chambray Carbureter

A carbureter which is claimed to handle seven different kinds of fuel is being marketed by the Chambray Carbureter Co.,

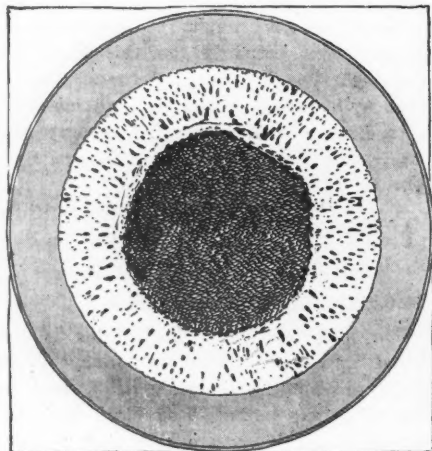


FIG. 3—GASOSAVA FUEL ECONOMIZER

When inserted between the mixing chamber and intake header this device is said to make a homogeneous mixture

Detroit, Mich. This device will handle, according to the maker, gasoline, kerosene, ether, naphtha, alcohol or distillate. This is accomplished by preheating the fuel by passing it through the exhaust manifold. In Fig. 5 is shown a cross-section of the Chambray carbureter and in Fig. 6 an outside view is illustrated.

As in an ordinary carbureter the fuel enters the float chamber A by passing through the pipe B. When the fuel gets within ¼ inch of the top of the spray nozzle C, the arm F, to which the cork float is attached rises and closes the fuel valves E. The suction of the pistons causes the fuel to be drawn through the nozzle and into the chamber O then up the tube J. The needle valve M controls the fuel opening. The size of the opening is controlled directly by the position of the throttle H, which actuates the cam movement L. Opening the throttle causes a proportionate opening of the needle valve M. The primary air is controlled by the valve N and this air, together with the fuel which has passed through the tube J, passes through the tube I which runs through the exhaust manifold. This preheated fuel passes then to the mixing chamber G and thence to the intake manifold. The throttle H is the controlling device of the Chambray carbureter, and tends to feed the motor a relatively proportionate mixture of fuel and air at all motor speeds. This carbureter is being offered at \$8 for the ¾-inch and \$26 for the 3-inch, intermediate sizes in proportion.

Dewey Spark Plug Pump

The Dewey-Anderson Co., Toledo, Ohio, is marketing the Dewey spark plug pump, the feature of which is that it has a

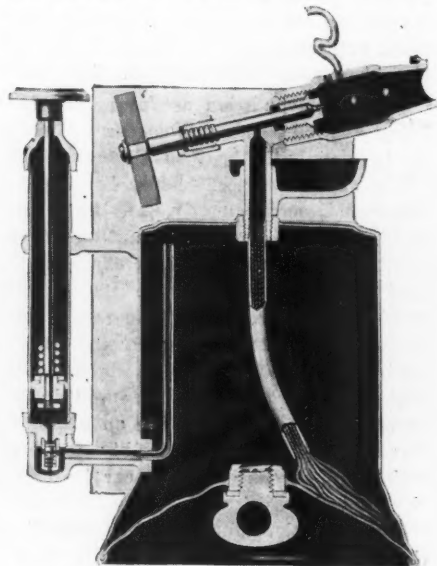


FIG. 4—WESTINGHOUSE BLOW TORCH

The drip cup of this device is deep so that cold weather starting will be facilitated

floating air chamber and a stationary piston. One end of the pump is placed in the hole occupied by a spark plug. On the suction stroke of the motor the floating air chamber is drawn to the bottom of the pump. There is a check valve at the bottom of the pump which permits air to pass through, and into the air chamber. On the compression stroke of the motor the air chamber is forced to the top of the pump which closes the inlet valve and permits the air to enter the hose line.

Superior Spark Plug

With the Superior spark plug connected in series with an ordinary plug, two sparks are made to occur in a cylinder at the same time. This plug, manufactured by the Superior Motor Specialty Co., Philadelphia, Pa., is illustrated in Fig. 8. The illustration at the left shows how the plug looks in an L-head cylinder and placed in series with an ordinary spark plug.

It is claimed that by the use of this plug, the two sparks occurring in two different places in the cylinder at the same time, not only insure ignition, but make the resulting explosion more complete, and this means less fuel consumption and more power. When the Superior plug is in the cylinder, as shown in Fig. 8, the current led to it jumps the gap in the plug, thus creating a spark and then the current continues to travel to the ordinary plug where another spark occurs and the current is grounded. To insert the Superior into a cylinder requires the threading of a valve cap. The maker is offering this type of spark plug at \$1.50.

Gasosava

A device which is said to break up the globules of gasoline passing through the carbureter, thus forming a more perfect mixture and at the same time making a saving in fuel, is being marketed under the name of Gasosava by the Gas Saver

Sales Co., New York. This device shown in Fig. 3 is inserted between the mixing chamber of the carbureter and the intake manifold of the motor, taking the place of the gasket. It is stated that the wick, which is part of the device, breaks up the little globules of gasoline which pass into the intake manifold into a more finely-divided state. It is claimed also that the presence of the Gasosava prevents any injury by fire due to backfiring of the motor, for flame cannot go beyond the wire screen which is part of the device. Three dollars is asked for the Gasosava.

Westinghouse Universal Blow Torch

Garagemen and motor car owners will be interested in a new gasoline blow torch being marketed by the Westinghouse Elec-

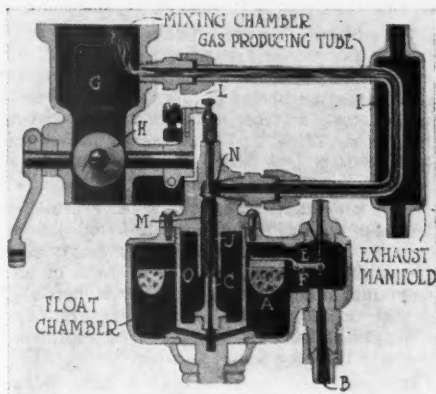


FIG. 6—CROSS-SECTION OF CHAMBRAY CARBURETER

The gas producing tube runs through the exhaust pipe

tric and Mfg. Co., Pittsburgh. It is known as the Universal torch because of its adaptability to all conditions of service. Figs. 4 and 5 show the inside and outside views of this new product. The burner valve is self-cleaning, the needle at the end of the valve stem cleaning the hole automatically with a turn of the handle. The burner is made heavy so that it will retain the heat. The drip cup, it will be noticed, is unusually deep so that cold weather starting will not be difficult. The handle of the torch is of fiber for the rea-

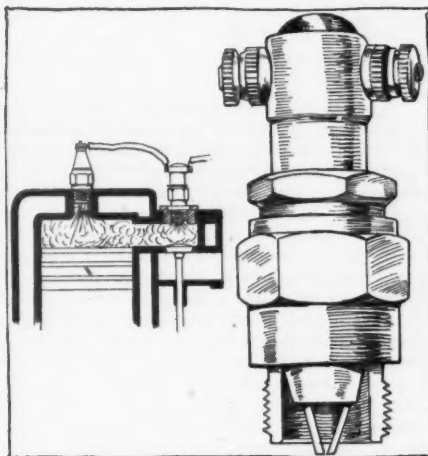


FIG. 7—SUPERIOR SPARK PLUG

With this plug in series with an ordinary plug two sparks will occur in one cylinder

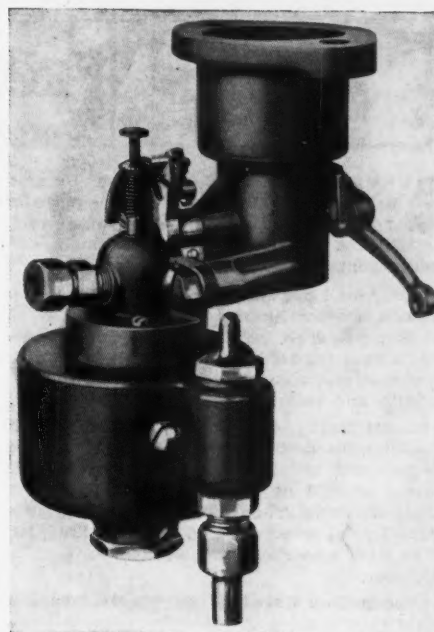


FIG. 8—OUTSIDE OF CHAMBRAY CARBURETER

This instrument is said to handle five different grades of fuel

son that this substance does not heat up as readily as metal. The torch is made in two sizes, holding respectively a pint and a quart of gasoline.

New Remy Magneto

A new waterproof and dustproof magneto is announced by the Remy Electric Co., Anderson, Ind. The feature of the new Remy is the fact that Bakelite, a very desirable compound for electrical apparatus, is freely used. This substance has high dielectric strength, is an ideal non-conductor, is strong and tough and has the power to resist great heat.

The instrument is of the wire-wound armature type and embodies detail improvements over the former Remy type. The magneto is known as the model P and is offered in two types, for four and six cylinder cars, respectively. A Bakelite cover is used for protecting the circuit-breaker.

The armature winding is of cotton-covered enameled wire, impregnated with Bakelite. The armature shaft operates on ball bearings which are made dustproof by the use of felt washers. The entire circuit-breaker may be removed without the use of tools and the control lever may be attached to either side of this breaker housing. It is claimed that spark intensity is almost the same at full retard as it is at advance, and that a timing range of 35 degrees is possible.

A device known as a timing button is incorporated in the distributor, the purpose of which is to facilitate resetting and timing of the magneto. To insure quiet running of the magneto the large magneto gear is made of bronze and the smaller one of cloth and steel. The switch used with this magneto is made integral with the coil.

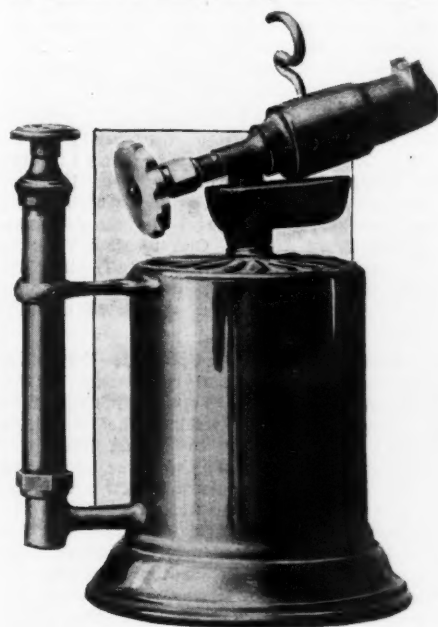


FIG. 5—OUTSIDE VIEW OF WESTINGHOUSE BLOW TORCH

The handle of this instrument is of fibre, a substance which will not retain heat readily



From the Four Winds



BURMAN Stars at Seattle—Bob Burman and the green Keeton were the stars of the speed meet held on the ½-mile track at Seattle, Wash., July 13. Burman won four events.

Tour for Nova Scotia Motorists—To stimulate a keener interest in touring in Nova Scotia, the Halifax Herald and the Evening Mail have donated a handsome trophy for a 500-mile motor car tour from Halifax to Yarmouth and return.

Constructing Motor Exhibit Building—A building to cost upwards of \$50,000 and in which will be placed motor car exhibits is being erected at the state fair grounds in Dallas, Tex. The building is being constructed of concrete and will be fireproof. The first motor car exhibit will be held in October.

Logan Club Growing—Fifty members have paid their dues to the Hocking County Automobile Club of Logan, O., and much enthusiasm is shown in the ranks of the membership. At a recent meeting of the club, Lewis M. Browne, secretary of the Ohio State Automobile Association, delivered a talk on the objects of that organization.

Gasoline Price Drops in Texas—Motor car drivers in Texas have been purchasing gasoline during the past few days at 16 cents per gallon, the cheapest the oil has been in years. The Dallas Automobile Club, the largest organization of the kind in the south, has appointed a committee to make an investigation and report back to the club.

Raise Ban on Motor Cars—At a meeting of the officials of Prince Edward Island, held last week in compliance to a petition signed by 1,700 citizens, it was decided to permit the running of motor cars in Charlottetown city and royalty on Monday, Wednesday and Thursday of each week. As the first fruits of this decision, four touring cars have been ordered. The order goes into effect at once.

Bill Frisco-Victoria Run—From San Francisco to Seattle, with a final stop at Victoria, B. C., is the route of a feature race planned for the Victoria carnival, the first week in August, when motor cars will compete in an endurance test over the Pacific highway from the Golden Gate to the Queen City. Taking the journey across Puget sound, which all competing cars must make, the contestants will cover 1,065 miles.

Holds Court in Motor Car—Judge Henry E. Jessen, of the East Hartford, Conn., police court, is an enterprising individual. In order that he might save time and permit the Rochester, N. Y., detectives to return to that city with a man under arrest in his jurisdiction, he heard the case in his motor car just over the new East Hartford bridge. Immediately after disposing of the case the judge conveyed his charge and the police officials to the Hartford railway station.

Uncle Sam Will Help—Three New England states, Maine, Vermont and Connecticut, will receive a total of \$70,000 from the federal government this year to aid in improving their highways, as \$140,000 more will be added by state authorities, making a total of \$210,000; better road conditions in these states should result. Maine gets the largest slice, \$50,000, and it will be spent improving the highway between Portland and Bath on the way to Augusta. When the road on the other side of Portland toward the New Hampshire line is finished, it will make a good through road from Boston to Augusta. Vermont and Connecticut each appropriated

\$20,000 and they get \$10,000 each from the federal government. The Vermont money will be spent on the road between Rutland and Burlington.

New Assistant Secretary—F. P. Stidham has resigned as assistant secretary of the Bay State Automobile Association and his place has been taken by R. A. Dobyns, who held that position a few years ago.

Alarm Sounds, Motor Starts—The chief of the fire department of Manchester, N. H., which consists largely of motor apparatus, has devised a means of starting the motors immediately an alarm of fire is sounded. The scheme has been found to be a time saver.

Fees Show Increase of Cars—Collections of motor car taxes for the first half of the year in Alabama show an increase of \$10,000 over the same period of last year. The total collections for the 6-monthly period this year were \$24,000. The increase is due almost entirely to the increased number of cars in use.

Runs on Patent Medicine—A. A. Wheeler of Mitchell, S. D., found himself 6 miles from home in a Studebaker car with an empty gasoline tank. He ran to the next house on gas from his motor primer, and got a bottle of patent medicine which carried him 2 miles to a supply of kerosene on which he completed the trip into town, he declares.

Badgers Run Motor Stage—A motor stage and freight line has been established between Howard and Franklin, in Sheboygan county, Wisconsin, under the direction of the Howard & Franklin Auto Car Co., capital stock \$5,000. No railroads or electric lines run through the territory in which the company operates its motor buses and commercial vehicles. The rates are approximately 3 cents per mile. August Frome, J. W. Grossbuesch, W. Buscher and Dr. A. Selker are the promoters of the enterprise.

Cars Block Omaha Traffic—Motor cars have become so numerous in Omaha and the practice of leaving them on the streets about office buildings during the day such an impediment to traffic that the Associated Retailers of Omaha, at their monthly banquet to be held soon, will take up the question, recommend some solution of the traffic problem to the city council. Among the remedies which are suggested are sending the cars home after Mr. Business Man arrives at his office, setting apart a certain section of the business district where motors may stand in the street, or providing some place where machines may be stored during the day.

Suggests Accident Remedy—A set of commandments or rules of conduct for motorists and pedestrians was laid down in a charge to a jury in an accident case by Judge O. T. Williams of the circuit court at Milwaukee recently. Judge Williams' accident remedy, which he believes will prove a panacea for such ills, is as follows: "Pedestrians and motorists have reciprocal rights. In the exercise of ordinary care, pedestrians must stop, look and listen; motorists must do the same. Motor cars should not be driven in excess of 6 miles an hour at street intersections. A reasonable rate of speed, however, does not depend upon specific speed law limits, but upon circumstances and conditions. When two or more courses of action are open, the law does not require that what is finally proved to have been the best course, be taken. Both driver and pedestrian have a right to act on the assumption that

every person will exercise care to avoid accidents. The law does not discriminate against motorists so long as they drive in a manner consistent with ordinary care."

Taaffe Joins Flat Team—Bill Taaffe, the Seattle boy who drove the National in the Tacoma races, has gone to California, where he joined Tetzlaff and hereafter will be a member of the Flat racing team.

Sermons from Motor Cars—The ministers of Lima, O., are planning a unique religious campaign for August. Motor cars will be brought into requisition as pulpits and services will be held in public parks and on street corners, sermons being delivered from the rear of the motor cars.

Truck Supplants Stage Coaches—An Alco truck has recently been put in service between Brewster and Twisp, Wash. The car will make a daily round trip of 54 miles between these two points. The truck does the work formerly done by two stage coaches and sixteen horses, and does it in much quicker time.

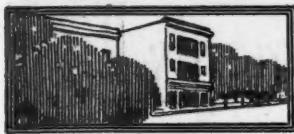
Closed Car in Long Tour—That it is not only possible but easy to make a trip across the continent in a closed motor car has been demonstrated by J. W. Catron of Los Angeles, who recently drove a Studebaker sedan model from his home on the Pacific coast to Rochester, N. Y., in 21 days, averaging 125 miles a day in his 3 week's journey.

Drives Car to Canyon's Brink—The distinction of piloting a motor car to a point where a car never has been driven before is one that rarely comes to the motorist nowadays, but George W. Jiminez of the Hudson motor car agency at Los Angeles achieved this feat recently when he drove a Hudson six to the head of the Bright Angel trail at the brink of the Grand Canyon of the Colorado.

Car Starts After Plunge—After a tumble of 50 feet over an embankment into the Stones river, near Nashville, Tenn., the car of J. W. Blair was started with its own electric self-starter and was taken to Nashville under its own power. The escape of Mr. Blair from serious injury is no more remarkable than the escape of the car. New wheels were substituted before bringing the car in, but the old tires were used.

After Cross-Country Record—Neil Whalen and Ralph A. Duff left Omaha Monday morning in a Matheson racing car in an attempt to break the cross-country record from Omaha to New York. The car—which is the same one Whalen drove in his record-breaking trip from Atlanta, Ga., to New York in 1911—is equipped with the Duff air type carburetor and gasoline, kerosene and motor spirits will be used on the drive of this week.

Horse Doctors Real Optimists—Optimism prevailed at the annual convention of the Wisconsin Society of Veterinary Graduates at Milwaukee last week. The surgeons found much comfort in saying that the threatened extinction of the horse by reason of the influx of motor cars is now a turning of the tables. In the words of Dr. J. W. Beckwith, of Shullsburg, secretary of the society: "The motor car is already passing as a pleasure vehicle and giving way to horseflesh. In place of the pleasure car we have saddle horses and buggies. Ten years ago men wanted speed, but as soon as they got it they tired of the motor car, with its monotonous mechanical contrivances, and are returning to the living, spirited horse for pleasure."



Among the Makers and Dealers



TESTING Track for Overlands—So persistent were Cleveland policemen in prosecuting testers of Overland cars, the Willys-Overland Co. has decided to build a testing track near the factory, on Central avenue.

Scharf Gearless Changes Location—The Scharf Gearless Motor Car Co., of Richwood, O., has filed papers with the secretary of state increasing its capital stock from \$5,000 to \$50,000 and at the same time changing its location from Richwood to Westerville, O.

Oil Company Increases Stock—The Northwestern Oil Co., of Superior, Wis., one of the large distributors of petroleum products in northwestern Wisconsin and the head-of-the-lakes country, has increased its capital stock from \$50,000 to \$100,000 to provide funds for extension of the business.

Purchase Perth Amboy Plant—The Hampton Kerosene Carburetor Co., Inc., has recently purchased the plant of the Motor Appliance Co. of America at Perth Amboy, N. J., and is now erecting a large addition to the factory so as to be able to turn out 100 carburetors daily within 60 days.

Ford Purchases Dallas Site—Work is expected to begin within a short time on the assembling plant of the Ford Motor Co. to be erected at Dallas, Tex. Two blocks of ground on which the plant will be located have been purchased at a cost of about \$100,000. The proposed plant will cost \$300,000.

Kissel Holds Sales Convention—Fifty branch managers, dealers and advertising specialists of the Kissel Motor Car Co. spent a week at the new Milwaukee works last week to watch the production of the new Kisselkar 6-48 model and discuss the coming season's prospects and business. From Milwaukee the party went to Hartford to inspect the main factory, later returning to Milwaukee for a final session.

Sues Maxwell for \$13,000—The Eastern Motor Sales Corp., of Richmond, Va., has instituted suit for \$13,000 against the Maxwell Motor Co., of Detroit, Mich., in the law and equity court. While no declaration has been filed, it is understood from General Manager R. B. Allport, of the Eastern Motor Sales Corp., that the suit was brought to recover damages suffered by his company due to the failure on the part of the Maxwell Motor Co. to deliver certain motor cars which it had contracted to supply between April 1, 1913, and the present date.

To Reopen Manitowoc Plant—The Manitowoc foundries of the Aluminum Castings Co., closed on May 1 because of continued labor troubles and transportation difficulties, and operations transferred to other middle western plants, will again become an active producer of aluminum castings. The Cleveland general offices have ordered the Manitowoc management to overhaul the plant and get it into shape for work. Most of the production at Manitowoc has been crankcases and other aluminum castings for motor cars.

Additional Drawback Allowed—The regulations issued by the treasury department on November 27, 1907, providing for the payment of drawback on motor cars manufactured by Brewster & Co., of New York, with the use of imported materials, have been extended to cover motor cars and motor car bodies by the Holbrook Co. and the Moore & Munger Co., of New York, with the use of chassis, plate glass, leather, carriage cloth, laces, metal fittings, speaking

tubes, rubber and cotton cloth, metal chains, etc. The sworn statement of the manufacturers has been filed with the collector of customs at New York.

Lenox Increases Capital Stock—The Lenox Motor Car Co., of Hyde Park, Mass., has increased its capital stock from \$350,000 to \$450,000 and Sales Manager William Blanchard has become one of the stockholders and a member of the board of directors.

Fabric Company Leaves Worcester—The Standard Woven Fabric Co., well known in the industry for its multibestos brake lining, is now located in a new factory at South Framingham, Mass. This will mean the abandonment of the old plant at Worcester, where facilities were inadequate.

Purchase Ohio Falls Plant—The Falls Cities Motor Co., organized to take over the plant of the Ohio Falls Motor Co., manufacturer of motor cars in New Albany, Ind., has filed articles of incorporation. The capital stock of the company is \$50,000 and the incorporators are Ferdinand Kahler, Orlando E. South, Archie C. Brock and George R. Elder. The plant of the Ohio Falls Motor Co. was disposed of at receiver's sale last week. The plant was bid in by Mr. South. It is understood the new concern will continue the operation of the plant in Vincennes street.

Olds "Old Crew" Organizes—One hundred or more men prominent today in the motor-izing industry who are graduates of the Olds Motor Works have organized a social club and plan to hold their first reunion at the Chicago motor show in 1914. Charles B. Wilson, now of the Ferro Machine and Foundry Co., of Cleveland, has been named chairman, and J. G. Utz, of the Maranville Base and Filter Co., of Cleveland, is secretary. R. D. Chapin, of the Hudson, C. D. Hastings, of the Hupp Corp., R. E. Olds and R. C. Hupp, S. S. Olds, Ralph Owen, R. M. Owen and J. J. Brady are among the familiar names on the list.

Maxwell Gets Indianapolis Plant—Within the last few days Jonathan D. Maxwell, formerly with the United States Motor Co., has filed a deed in Indianapolis covering his recent purchase of the plant formerly operated by the T. B. Laycock Mfg. Co., The purchase was made from the Pittsburgh Manor Co., Pittsburgh, Pa., which bought the property at receiver's sale. Mr. Maxwell paid \$350,000 for the property, which includes an enormous factory building and 40 acres of land. He is now organizing a company for the manufacture of motor cars and it is thought manufacturing operations will start within the next few weeks.

Steel Company to Open Plant—The Federal Pressed Steel Co., of Milwaukee, expects to be able to commence operations of its big plant now under construction at Keefe avenue and North Pierce street, on August 20 or September 1. In preparation for the commencement of work the company has increased its capital to \$150,000 and made important additions to its executive and operating staffs. James G. Cowling, formerly general manager of the motor car department of the J. I. Case company, Racine, and previously in charge of the Plerce Motor Co.'s operations until this concern was absorbed by the Case interests, has been elected a director and vice-president of the Federal company and will have charge of the sales department. The company will start with 150 employees and turn

less steel, specializing in motor car work. George F. Markham is president and Arthur W. Fairchild is secretary and treasurer. out all kinds of hydraulic pressed and seam-

Whitney Company Enlarges Plant—The Whitney Mfg. Co., of Hartford, Conn., manufacturer of driving chains, is making preparations for a concrete addition to its factory, to be 60 feet wide, 112 feet long and four stories high.

To Manufacture Engine Castings—The Wisconsin Cylinder Foundry Co. has been organized at Racine, Wis., to establish a gray iron foundry for the production of engine castings for motor manufacturers. The company has a capital stock of \$25,000 and is owned by Knut Tomsen, John Holz and E. J. Akr.

Building Motor Car Harvester—The American Mfg. Corp., organized some time ago in Indianapolis, is developing a motor harvesting machine and general utility tractor, which is to be placed on the market shortly. It is claimed that the machine will plow, harrow, drill, reap, mow and haul grain and other farm products to market.

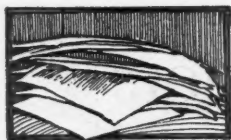
Sell McGraw Tire Stock—A committee of business men of East Palestine, O., has started to sell an issue of \$100,000 of stock of the McGraw Tire and Rubber Co., upon an agreement that the company will erect a four-story factory and that the number of employees will be increased from 500 to 1,500. It is planned to make 5,000 tubes and tires daily.

Lauth-Juergens Elects Directors—At the annual meeting of the stockholders of the Lauth-Juergens Motor Car Co., at Fremont, O., held last week, the following directors were elected: J. Lauth and Phil Lauth, Chicago; J. W. Worst, L. C. Worst, J. W. Forsyth, W. A. Lucas, L. W. Overmeyer and A. E. Culbert. The plant is now running at capacity.

Standard to Make Motor Cars—It has been unofficially announced that the Standard Steel Car Co., with a plant in Butler, Pa., and offices in Pittsburgh, Pa., will enter the motor car manufacturing field. It is stated that the factory will be erected adjacent to the company's Butler works and that the buildings and equipment will cost about \$2,000,000.

Patent New Gas Generator—The Uhrlandt Gas Generator Mfg. Co., of Columbus, O., recently chartered with an authorized capital of \$50,000, has been organized by the election of Samuel A. Esswein, president; Arthur Uhrlandt, vice-president, and H. D. Shepard, secretary-treasurer. The concern will manufacture gas generators for the purpose of using kerosene for the running of motor cars. Patents have been applied for on two of the processes used. It is claimed that a gallon of kerosene will run a car three times the distance of a gallon of gasoline.

Laub Heads Truck Company—Frank E. Laub, of Lima, O., formerly of Bowling Green, where he was identified with the Gramm Motor Truck Co. prior to its removal to Lima, has been elected president and general manager of the National Motor Truck and Mfg. Co., of Gibsonburg, O., capitalized at \$250,000, with \$100,000 stock issued. Other officers of the company are A. T. Crossett, first vice-president; C. H. Hutchinson, second vice-president; John O'Leary, Toledo, secretary, and J. A. Nieset, treasurer. It will make 2, 1 and ½-ton trucks.



Brief Business Announcements



Recent Agencies Appointed by Motor Car Manufacturers

PASSENGER CARS

Town	Agent	Make
Boston, Mass.	Peerless Motor Car Co.	Rauch & Lang
Brockton, Mass.	F. W. & W. A. Swift	Paige-Detroit
Clarksville, Tenn.	Williams & Runyon	Franklin
Carson, Ia.	Hooker Bros.	Detroit
Columbus, O.	F. P. Corbett & W. H. Batdorf	Paterson
Columbus, O.	Gaither Auto Co.	Wahl
Elliot	William Cletes	Empire
Golden, B. C., Canada	Franklin Motor Car Co.	Franklin
Grand Island, Neb.	Jarvis & Bauder Co.	Empire
Gothenburg, Neb.	Sandstrom & Anderson	National
Gloucester, Mass.	F. P. Woson	Paige-Detroit
Hartford, Conn.	Universal Auto Co.	Franklin
Henderson, Ia.	H. Buck	Empire

Town	Agent	Make
Lakewood, N. J.	McCue & Beecroft	Franklin
Logan, Ia.	Kennedy Brothers	Detroit
Lincoln, Neb.	E. W. Fry	Empire
Lynn, Mass.	C. E. Whitten	Paige-Detroit
Milwaukee, Wis.	Mitchell Auto Co.	Detroit
Neligh, Neb.	Daxon Implement Co.	Detroit
New Haven, Conn.	King Motor Car Co.	King
Philadelphia, Pa.	Minerva Motors Co.	Minerva
Wisner, Neb.	Chris Jensen	Regal
Wahoo, Neb.	Stratton & Hanson	Empire
Woodbine, Ia.	Snyder Auto Co.	Empire
Washington, D. C.	T. Lamar Jackson	Stevens-Duryea

COMMERCIAL CARS

Bridgeport, Conn.	Buckley Motor Car Co.	Modern
Cromwell, Conn.	Cromwell Garage	Modern
Eau Claire, Wis.	Tanberg Auto Co.	Federal
New Britain, Conn.	H. N. Dickinson	Modern

Norwalk, Conn.	F. E. Lockwood & Co.	Modern
New Haven, Conn.	Hotchkiss Motor Co.	Modern
Minneapolis, Minn.	Menominee Motor Truck Co.	Menominee
Torrington, Conn.	E. B. Pratt	Modern

DEFIANCE, O.—The Compo Automobile Co., of Defiance, O., has purchased the old skating rink on Front street and will remodel it into a modern garage and repair shop.

Philadelphia, Pa.—A Philadelphia agency of the Hardman Tire and Rubber Co., of New York, has been established at 1923 Sansom street, with J. A. McTaggart as manager.

Allerton, Ill.—Barton Parish, who for the past year has maintained a salesroom here, has purchased the garage formerly owned by Wingfield & Hood and will conduct a garage and machine shop, as well as sell motor cars, under the name of Barton Parish Garage and Machine Shop.

New York—The Chevrolet Motor Co.'s New York and Brooklyn branches were formally opened July 10 under the direction of Charles M. Welsh, the general sales manager, with George H. Commor in charge of the New York salesrooms and Warren A. Sellon in

charge of the Brooklyn agency. The New York branch factory will be ready for the production of cars August 1.

Chicago—The members of the Chicago Garage Owners' Association and Electric Vehicle Association of America will hold their first annual field day and picnic at Cedar Lake, Ind., July 25.

Boston, Mass.—W. L. Curtis, recently a member of the sales staff of G. E. and H. J. Habich company, agents for the Cole in Boston, has resigned to accept a position with the New England branch of the Oakland at Boston.

Columbus, O.—The Standard Motor Car Co., organized in Columbus recently to take over the 1914 distributing agency for the Hudson, has closed a contract for the lease on the salesroom and repair shop at 23 and 25 North Fourth street, formerly occupied by Robert F. Boda Co. The concern took possession of the new location July 15. The organizers of the company are B. M. Ellis,

H. J. Schwartz, Harry Mason, Bert E. South and Sam J. Morris. The Robert F. Boda Co., agent for the Mitchell and Reo, moves to the Hartman building.

New York—C. B. Wisenburgh, traveling representative of the American Distributing Co., of Jackson, Mich., has resigned to accept the branch management of New York city of the Remy Electric Co., of Anderson, Ind.

Richmond, Va.—Mercer W. Christian, trading under the firm name of the Jefferson Garage, 11 West Main street, through his attorney, James R. Russell, has filed a petition in voluntary bankruptcy in the United States district court here.

Philadelphia, Pa.—J. E. Gomery, member of the Gomery-Schwartz Motor Car Co., local agency of the Hudson and the Stewart truck, has been elected secretary-treasurer of the Philadelphia Automobile Trade Association to fill the vacancy created by the resignation of F. W. Eveland.

Boston, Mass.—John V. Wilson Co., capital stock, \$20,000; to manufacture electrical and mechanical devices; incorporators, E. T. Carr, J. V. Wilson, P. H. Skidmore.

Boston, Mass.—Blue Hill Avenue Garage; capital stock, \$10,000; incorporators, F. H. Sidelinger, W. A. Clark, S. W. Culver.

Boston, Mass.—Chauncey S. Greene Co., capital stock, \$20,000; motor car business; incorporators, A. A. Hoyt, E. S. Atwood, C. S. Greene.

Boston, Mass.—Marathon Automobile Co., capital stock, \$25,000; incorporators, W. Sanford, B. Killars, T. Johnson.

Boston, Mass.—Moebus Wheel Co., capital stock, \$100,000; to manufacture wheels; incorporators, A. F. McGettrick, G. B. Ryan, F. E. Peaslee.

Boston, Mass.—Marathon Automobile Co., capital stock, \$25,000; incorporators, W. S. Killars, A. L. Schoolcraft.

Brooklyn—Trautman Corp., capital stock, \$1,000; manufacture tires; incorporators, E. M. Trautman, F. A. Webb, C. Colsten.

Brooklyn, N. Y.—Grand Avenue Co., capital stock, \$500; to manufacture motors; incorporators, G. F. Mason, F. G. E. Strohsall, H. W. Bender.

Brooklyn, N. Y.—E. A. Laboratories; capital stock, \$100,000; to manufacture accessories; incorporators, E. Aufero, M. Aufero, D. Aufero.

Carrollton, Ky.—Wood Auto & Machine Co., capital stock, \$10,000; incorporators, E. A. Wood, J. P. Monnyhan, E. C. Smith, F. B. Gaines.

Chicago—C & B Garage, capital stock, \$1,000; incorporators, A. E. Cooley, K. R. Ballentine, S. J. Matthews.

Cincinnati, O.—W. L. Auto Top Lifting Co., capital stock, \$10,000; to manufacture and deal in top lifting devices; incorporators, W. Wirth, Oscar Lane, H. W. Fraser, G. M. Reswick, J. B. Clark.

Cleveland, O.—Cady Auto Jack Co., capital stock, \$10,000; to manufacture and deal in jacks; incorporators, O. O. Vrooman, J. C. Logue, C. E. Mellen, P. A. White, L. A. O'Neal.

Cleveland, O.—Ohio Buick Co., capital stock, \$200,000; to manufacture and deal in parts and supplies; incorporators, R. H. Lee, W. J. Patterson, G. R. Collar, G. M. Gallagher, E. M. Holmgren.

Recent Incorporations

Detroit, Mich.—Anguish Mfg. Co., capital stock, \$50,000; to manufacture parts and accessories.

Gibbsburg, O.—National Motor Truck & Mfg. Co., capital stock, \$250,000; to manufacture and deal in motor cars; incorporators, E. C. Russell, C. H. Hutchison, J. H. O'Leary, A. T. Crossett, F. E. Lamb, J. E. Weisel, N. W. Russell.

Lansing, Mich.—Detroit Automobile Exchange, capital stock, \$2,000.

Lawrence, Mass.—John E. O'Neil, capital stock, \$3,000; incorporators, J. E. O'Neil, M. J. Ganley, E. J. Farley.

Middleton, N. Y.—Talking Horn Co., capital stock, \$10,000; to manufacture horns; incorporators, N. C. Oddo, T. H. Bingham, F. W. Morgans.

Mobile, Ala.—Motor Machine Co., capital stock, \$10,000; to repair cars; incorporators, W. D. Bellingrath, J. E. Lewis, G. W. Morse.

New York—Anthony Auto Repair Co., capital stock, \$10,000; to manufacture and deal in motor cars; incorporators, J. Yandrasitch, F. M. Struckhausen, H. Struckhausen.

New York—Michigan Motor Car Co., capital stock, \$1,500; incorporators, K. Harman, C. A. Wolfe, J. A. Murphy.

New York—Vacuum Tire Corp., capital stock, \$50,000; incorporators, W. J. Woodcock, C. G. Ross, F. L. B. Gartner.

New York—LeCompte Cycle Car Corp., capital stock, \$60,000; to manufacture cycle cars; incorporators, G. Goldmark, L. S. Higgins, H. R. Buckingham.

New York—Hayes Diefenderfer Co., capital stock, \$10,000; incorporators, L. W. Bennett, E. Hayes, A. J. Diefenderfer.

New York—Michigan Motor Car Co., capital stock, \$31,500; incorporators, K. Harman, J. A. Murphy, C. A. Wolfe.

New York—Hayes-Diefenderfer Co., capital stock, \$10,000; to deal in motor cars; incorporators, A. J. Diefenderfer, E. Hayes, L. W. Bennett.

New York—Steinbock Engineering Co., capital stock, \$250,000; to manufacture; incorporators, H. F. Steinbock, A. B. Gormully, F. C. Slevera.

New York—Standard Purchasing Co., capital stock, \$10,000; to deal in motor cars; incorporators, H. F. Dexter, M. H. Brooks, H. L. Cook.

New York—Vanden Plas of America; capital stock, \$10,000; to manufacture and deal in bodies; incorporators, L. Perera, A. V. Plas, W. S. Newhouse.

New Albany, Ind.—Falls Cities Motor Co., capital stock, \$50,000; incorporators, F. Kahler, O. E. South, A. C. Brock, G. R. Elder.

Orange, Conn.—Cameron Mfg. Co., capital stock, \$1,000,000; to manufacture and deal in motor cars; incorporators, F. S. Corley, T. M. Steele, H. F. Parmelee.

Pulaski, Va.—City Auto Corp., capital stock, \$10,000; incorporators, S. M. Lyons, W. H. Wyser, R. L. Gardner.

Philadelphia, Pa.—Mecca Automobile Society; capital stock, \$50,000; incorporators, C. M. Miller.

Philadelphia, Pa.—M & S Automatic Vending Machine Co., capital stock, \$10,000; incorporators, L. M. Packer, J. M. Weitzman, I. Siegel.

Philadelphia, Pa.—National Rubber Co., capital stock, \$2,000,000.

Washington, Ind.—City Automobile Co., capital stock, \$3,000; incorporators, G. H. Greenwood, L. G. Helphenstine, A. L. Kennedy.

Wheeling, W. Va.—Schick Wheel & Tire Co., capital stock, \$150,000; to manufacture and sell tires and wheels; incorporators, A. Schick, J. E. Morgan, D. H. Taylor, L. F. Gundling, R. Walter, Marshall Stalter, O. A. Stalter.

Wilmington, Del.—Chesterhill Gasoline Co., capital stock, \$5,000.

Yonkers, N. Y.—Bell Locomotive Works, capital stock, \$20,000; to deal in motor cars and parts; incorporators, H. W. Bell, J. H. Bell, F. W. G. Bellows.



Prepare for Touring by Installing a Stromberg Carburetor

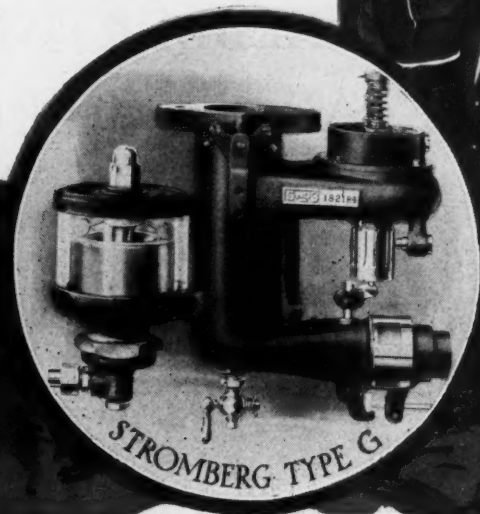
Before starting on your touring trip this summer take your car to our nearest Service Station and have it equipped with an improved 1914 model STROMBERG. Try it free, any way you will, for 30 days.

Touring, as every motorist knows, is the carburetor acid-test. If on your trip the improved features of the 1914 STROMBERG do make for increased power, economy, and flexibility, we couldn't buy our instrument back at twice its cost; if it shouldn't do these things, we'll take our carburetor back, re-install your old carburetor, and the trial will have cost you absolutely nothing. Either way you can't lose.

Stromberg Motor Devices Company
54 East 25th Street Chicago, Illinois

BRANCHES:
NEW YORK BOSTON DETROIT INDIANAPOLIS MINNEAPOLIS

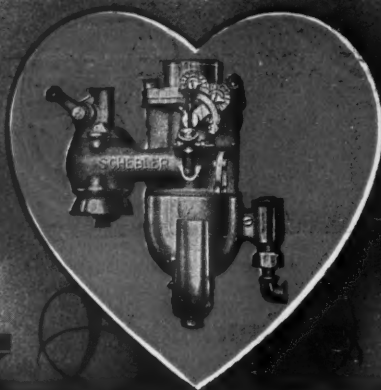
PACIFIC COAST DISTRIBUTORS: Chasler and Lyon Co., Los Angeles, Portland, Fresno, Spokane, San Francisco, Seattle, Canadian Distributors: Russell Motor Car Company, Toronto, Montreal, Hamilton, Winnipeg, Calgary, Vancouver.



When Writing to Advertisers, Please Mention Motor Age.

SCHEBLER

*The Aristocrat
of Carburetors*



"The Heart of the Automobile"

WHEELER & SCHEBLER

"Pioneers in Perfection" of Carburetion

MANUFACTURERS
INDIANAPOLIS U.S.A.

THE SCHEBLER IS THE ACKNOWLEDGED
STANDARD CARBURETOR OF THE WORLD

Branches

NEW YORK
BOSTON
PHILADELPHIA
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SEATTLE
MONTREAL CAN.
SIDNEY AUSTRALIA

Service Department

Distributors

Every city and town in
the United States and
Canada • Europe and
Australia

American Museum of Safety favors Standard Warning Signal

From an article in the Scientific American Supplement of April 12th, by Frederic Remsen Hutton, Vice-Pres. American Museum of Safety, Vice-President American Society of Mechanical Engineers, Chairman of Technical Committee, Automobile Club of America.

A WARNING SIGNAL must not only impress sound waves on the drum of the ear, but it must reach the mind behind the ear and cause volitional action. The signal should carry its alarm notice over the distance of at least one block, to even a deaf or slow-moving person, against the wind and other noise of the street.

"The warning signal should be of the quality not attaching to any other street noise and it should be audible from such a distance that the person warned should not jump with a nervous movement to avoid something that seems at his side before he knew it was anywhere near him. To sound the signal unnecessarily not only makes the street more noisy than necessary, but also it breeds the habit of disregarding the signal when it is full of real meaning.

"A true musical note is not as serviceable for arousing attention or for warning. The short explosive note of the diaphragm types of signal, where a steel diaphragm is set vibrating by an electric motor, makes the first sound waves as effective as those which leave the signal later, and this is its best claim to be a safety device, in the sense that the American Museum of Safety uses that term.

"The common pneumatic reed actuated from a hand-bulb cannot be heard in noisy traffic or against strong winds for any considerable distance, or even a city block, and is scarcely, therefore, entitled to be classed among safety devices, in the Museum sense."

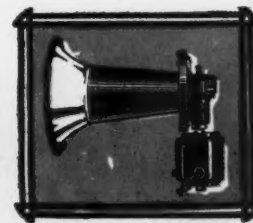


KLAXONET

Lovell-McConnell Mfg Company Newark, N.J., U.S.A.

KLAXON

"The Public Safety Signal"



KLAXON

This advertisement set in "Klaxon" type especially designed by F. W. Goudy:

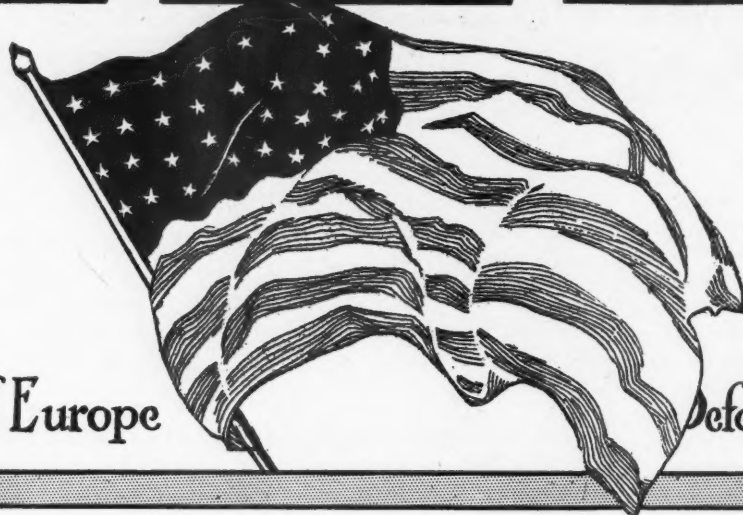
World's Stock Champion.
Fastest Stock Mile

Fastest 500 Miles in
Competition

National

Demonstrated To Be

America's Greatest Motor Car



Conqueror of Europe

Defender of America

The one and only American-made car that remains superior to all Foreign cars in demonstrations of speed, power and reliability in the International 500-mile races.

National 6:21:06 winner in 1912
Fiat 6:31:29 second in 1912
Peugeot 6:35:05 winner in 1913
(The National was not entered in 1913)

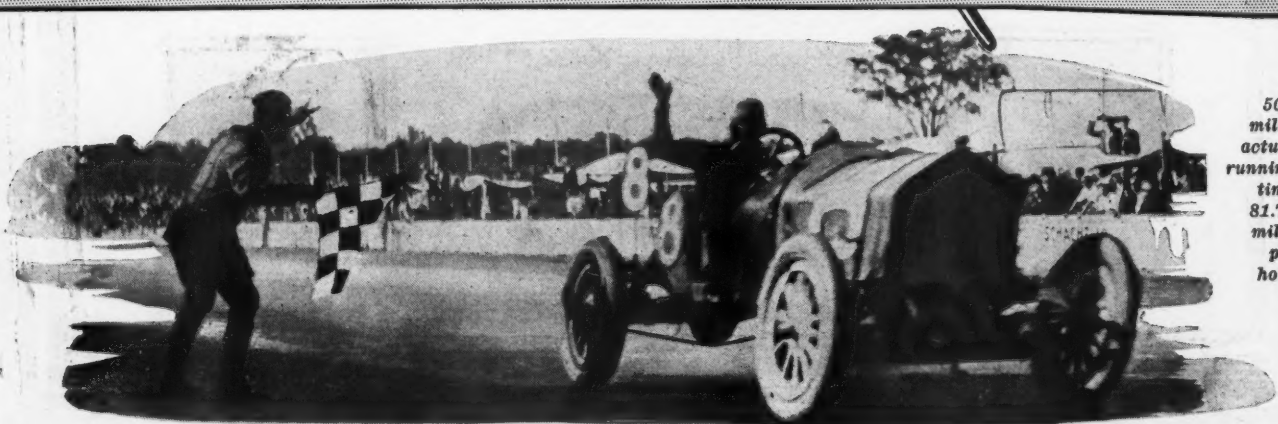
Others may come and go, but the National continues to lead all the world. This has significance to you. For years and years the National has maintained its superior quality, a perfection in materials, design and construction that sets the standards. Others may imitate the National's beautiful and stately appearance, but its reliability and efficiency are above counterfeit.

Immediate delivery, New Series V-3

FIVE MODELS—\$2750 TO \$3400

Electric Starter—Electric Lights—Center Control—Left Side Drive—Access to both front doors—Long stroke flexible motor

NATIONAL MOTOR VEHICLE CO. INDIANAPOLIS INDIANA



500
miles
actual
running
time
81.72
miles
per
hour

When Writing to Advertisers, Please Mention Motor Age.

Index To Automobile Manufacturers Who Have Contracted For



Storage Batteries

A	
Abbott Motor Co.....	Detroit, Mich.
Adams-Lancia Co.....	New York City
Allen Motor Car Co.....	Fostoria, Ohio
Alpena Motor Car Co.....	Alpena, Mich.
American La France Fire Engine Co.....	Elmira, N. Y.
American Locomotive Co.....	Providence, R. I.
American Motors Co.....	Indianapolis, Ind.
Ames Motor Car Co.....	Owensboro, Ky.
Apperson Bros. Automobile Co.....	Kokomo, Ind.
O. Armleder Company.....	Cincinnati, Ohio
Auburn Automobile Co.....	Auburn, Ind.
Austin Automobile Co.....	Grand Rapids, Mich.
The Avery Company.....	Peoria, Ill.
B	
Bartholomew Company.....	Peoria, Ill.
Benton Motor Car Co.....	Benton, Ill.
Buckeye Manufacturing Co.....	Anderson, Ind.
C	
Canadian Standard Auto & Tract. Co.....	Fort Wayne, Ind.
Cartecar Company.....	Pontiac, Mich.
J. I. Case T. M. Machine Works.....	Racine, Wis.
Chadwick Engineering Works.....	Pottstown, Pa.
Chandler Motor Car Co.....	Cleveland, Ohio
F. Coleman Carriage & Harness Co.....	Illion, N. Y.
Columbus Buggy Company.....	Columbus, Ohio
Commerce Motor Truck Co.....	Detroit, Mich.
Corbitt Automobile Co.....	Henderson, N. C.
Crane Motor Car Co.....	Bayonne, N. J.
Crawford Automobile Co.....	Hagerstown, Md.
Crescent Motor Company.....	Cincinnati, Ohio
Crow Motor Car Co.....	Elkhart, Ind.
James Cunningham Son & Co.....	Rochester, N. Y.
Cutting Motor Car Co.....	Jackson, Mich.
Croxton Motor Car Co.....	Washington, Pa.
D	
Geo. W. Davis Carriage Co.....	Richmond, Ind.
DI Dion Bouton.....	New York City
Dorris Motor Car Co.....	St. Louis, Mo.
E	
Enger Motor Car Co.....	Cincinnati, Ohio
Elkhart Carriage & Harness Co.....	Elkhart, Ind.
F	
F. I. A. T. Company.....	Poughkeepsie, N. Y.
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H. H. Franklin Manufacturing Co.....	Syracuse, N. Y.
G	
Gramm-Bernstein Company.....	Lima, Ohio
Gramm Motor Truck Co.....	Lima, Ohio
Gramm Motor Truck Co.....	Walkerville, Ont.
Great Western Automobile Co.....	Peru, Ind.
H	
Havers Motor Car Co.....	Port Huron, Mich.
Haynes Automobile Co.....	Kokomo, Ind.
Henderson Motor Car Co.....	Indianapolis, Ind.
Herreshoff Motor Co.....	Detroit, Mich.
I	
Ideal Motor Car Co.....	Indianapolis, Ind.
Imperial Automobile Co.....	Jackson, Mich.
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Jackson Motor Car Co.....	Jackson, Mich.
K	
Kelly-Springfield Motor Truck Co.....	Springfield, Ohio
King Motor Car Co.....	Detroit, Mich.
Kissel Motor Car Co.....	Hartford, Wis.
Kline Motor Car Co.....	Richmond, Va.
Knox Automobile Co.....	Springfield, Mass.
Krit Motor Car Co.....	Detroit, Mich.
L	
Lenox Motor Car Co.....	Boston, Mass.
Lexington Motor Car Co.....	Connersville, Ind.
Little Motor Car Co.....	Flint, Mich.
Locomobile Co. of America.....	Bridgeport, Conn.
Lozier Motor Car Co.....	Detroit, Mich.
Lyons Atlas Co.....	Indianapolis, Ind.
M	
W. H. McIntyre Co.....	Auburn, Ind.
McLaughlin Motor Car Co.....	Oshawa, Ont.
Marathon Motor Co.....	Nashville, Tenn.
Marion Motor Car Co.....	Indianapolis, Ind.
Maritime Motor Car Co., Ltd.....	St. John, N. B.
Martindale & Millikan.....	Franklin, Ind.
Maxwell Motor Car Co.....	Detroit, Mich.
Mercer Automobile Co.....	Trenton, N. J.
Metzger Motor Car Co.....	Detroit, Mich.
Michigan Buggy Co.....	Kalamazoo, Mich.
Midland Motor Car Co.....	Moline, Ill.
Mitchell-Lewis Motor Car Co.....	Racine, Wis.
Moline Automobile Co.....	East Moline, Ill.
Moon Motor Car Co.....	St. Louis, Mo.
Motor Car Manufacturing Co.....	Indianapolis, Ind.
N	
Nance Motor Car Co.....	Philadelphia, Pa.
National Motor Vehicle Co.....	Indianapolis, Ind.
Nordyke & Marmon Co.....	Indianapolis, Ind.
Norwalk Motor Car Co.....	Martinsburg, W. Va.
Nova Scotia Carriage Co.....	Kentville, N. S.
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O	
Oakland Motor Car Co.....	Pontiac, Mich.
P	
Packard Motor Car Co.....	Detroit, Mich.
Paige-Detroit Motor Car Co.....	Detroit, Mich.
Palmer & Singer Mfg. Co.....	Long Island City, N. Y.
Patterson Wagon Works.....	Flint, Mich.
Peerless Motor Car Co.....	Cleveland, Ohio
Pilot Motor Car Co.....	Richmond, Ind.
Pope Manufacturing Co.....	Hartford, Conn.
Premier Motor Car Co.....	Indianapolis, Ind.
Pullman Motor Car Co.....	York, Pa.
R	
Regal Motor Car Co.....	Detroit, Mich.
Renault-Freres Selling Co.....	New York City
Reo Motor Car Co.....	Lansing, Mich.
Reo Motor Car Co. of Canada.....	St. Catharines, Ont.
Russell Motor Car Co.....	West Toronto, Ont.
S	
Sayers & Scovill Co.....	Cincinnati, Ohio
Schacht Motor Car Co.....	Cincinnati, Ohio
Seagrave Company.....	Columbus, Ohio
Selden Motor Car Co.....	Rochester, N. Y.
Simplex Automobile Co.....	New Brunswick, N. J.
A. O. Smith Company.....	Milwaukee, Wis.
South Bend Motor Car Works.....	South Bend, Ind.
Spaulding Manufacturing Co.....	Grinnell, Iowa
Speedwell Motor Car Co.....	Dayton, Ohio
Stanley Motor Car Co.....	Newton, Mass.
Staver Carriage Co.....	Chicago, Ill.
F. B. Stearns Co.....	Cleveland, Ohio
Stegeman Motor Car Co.....	Milwaukee, Wis.
Sternberg Manufacturing Co.....	Milwaukee, Wis.
Stevens-Duryea Co.....	Chicopee Falls, Mass.
Stoddard-Dayton Co. (Maxwell).....	Dayton, Ohio
Studebaker Corporation.....	Detroit, Mich.
T	
Tudhope Motor Car Co.....	Orillia, Canada
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Vandewater & Company.....	Elizabeth, N. J.
Velle Motor Vehicle Co.....	Moline, Ill.
W	
Warren Motor Car Co.....	Detroit, Mich.
Wayne Works.....	Richmond, Ind.
Webb Company.....	Allentown, Pa.
Westcott Motor Car Co.....	Richmond, Ind.
White Company.....	Cleveland, Ohio
Wichita Falls Motor Co.....	Wichita Falls, Tex.
Willis-Overland Co.....	Toledo, Ohio
Winton Motor Car Co.....	Cleveland, Ohio
Z	
Zimmerman Manufacturing Co.....	Auburn, Ind.

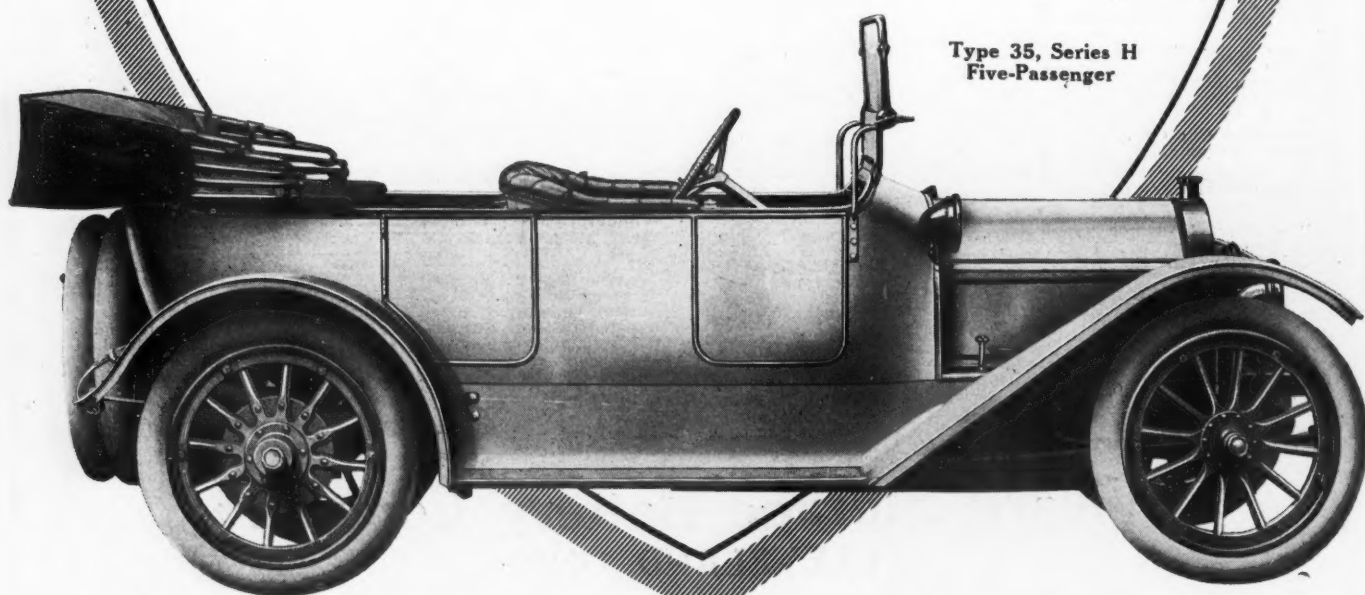
Willard Storage Battery Company
CLEVELAND, OHIO

(41)

MERCER

DEALERS' agreements for Mercer cars are now being made. Analysis of the automobile demand shows a decided tendency toward high-grade cars of medium weight. Mercer cars meet this demand in every respect, and Mercer dealers are assured of a steady and increasing business. Progressive and reliable dealers are wanted in unallotted territory. Inquiries will receive prompt attention.

Mercer Automobile Company
800 Whitehead Road Trenton, N. J.



Type 35, Series H
Five-Passenger

When Writing to Advertisers, Please Mention Motor Age.



"Automobile—
a motor vehicle"

*From Webster's New
Standard Dictionary*

Trade-Marking a Famous Motor

Engrave on the tablets of your memory this trade-mark. It is the stamp of a good motor, and a good motor is the solid foundation of a good automobile. The dictionary makers realized this, when they defined an Automobile as a "Motor Vehicle;" all men who motor acknowledge it; and more than 50 of America's leading motor vehicle makers proclaim it by building their cars upon the sure groundwork of the Continental Motor.

¶ A weak foundation has ruined many a costly edifice. Down to bed rock must go the substructure; down—in the case of a motor vehicle—to the hard and fast assurance of a motor with power, with speed, with certainty of service, with sales prestige, with long years of life-span.

¶ The name of the motor—symbol of power—reveals the character of the car. For the motor is the key to the whole construction—the costliest and most vital factor. Every motorist should know this, and Continental advertising is going to make this knowledge public property.

¶ Continental motors date back to 1903. They have perennial youth in design—the maturity of age in experience. Over 75,000 are now in use—developing, daily, more than six times the horsepower taken from Niagara. Best known cars—cars that have conquered the world's markets—have swept to success carrying the Continental Motor.

¶ To the companies making these cars, their engineers as well as our own, belongs the proud distinction of having made "Continental motors America's standard." For the counsel of these many engineers, some of whom not only stand as leaders in their profession but are individually known to every American who reads, has had much to do in the final perfecting of Continental motors.

¶ These are the far-seeing, level headed men who, building for the competition coming, have already specified over 40,000 Continental motors for 1914.

¶ Not made to meet a price, not built to shatter records of quantity, Continental motors are constructed to fulfill a service ideal—to be a true foundation for a worthy motor vehicle.

¶ For this we trade-mark our product.

Continental Motor Mfg. Co.

Largest Exclusive Motor Builders in the World

Factories: ^{Detroit,} Muskegon, Mich.

Detroit, Michigan

When Writing to Advertisers, Please Mention Motor Age.

Get In Before The Gate Closes

The day after we made our first announcement of the fact that we were ready to assign territory on the phenomenal new Wahl Car, we received 147 telegrams, besides a flood of letters from dealers in every part of the country, applying for territory.

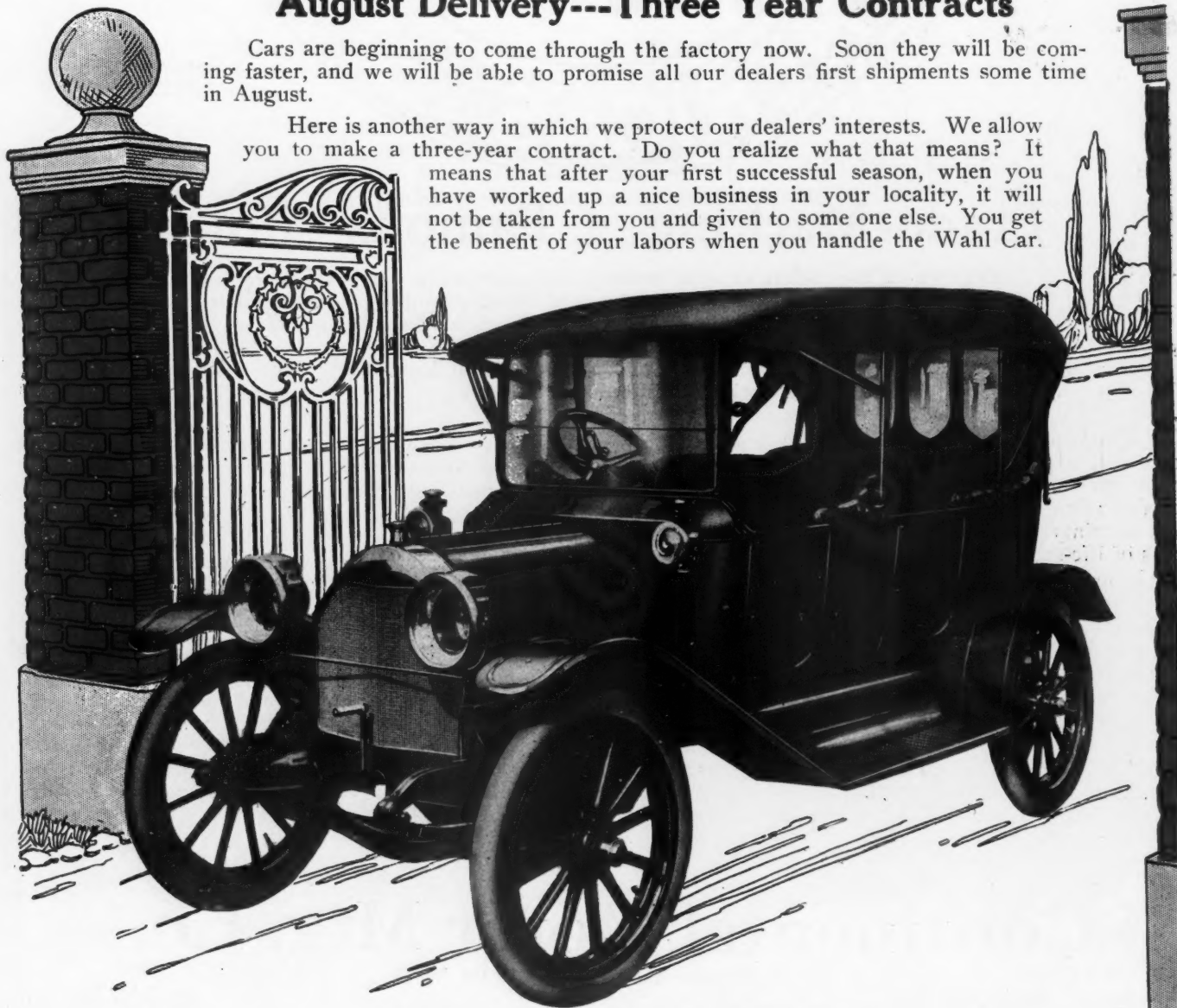
This we regard as a very natural result of such astonishing value as we offer in the Wahl Car. Experienced automobile men know that such a car as we are building will be snapped up by the public in very short order. It represents exactly what so many people are looking for—a real automobile, rich in appearance, modern in design, complete and high-grade in equipment, at a price hitherto considered impossible.

Here is the point for you, Mr. Dealer. It will take but a little more time to get all the dealers we can possibly supply for 1914. 5,000 cars will be our limit for this coming season. We would like to make more, and take care of everybody, but our facilities are limited. Our advice to you is to wire at once, or write if you prefer, and get your territory secured.

August Delivery---Three Year Contracts

Cars are beginning to come through the factory now. Soon they will be coming faster, and we will be able to promise all our dealers first shipments some time in August.

Here is another way in which we protect our dealers' interests. We allow you to make a three-year contract. Do you realize what that means? It means that after your first successful season, when you have worked up a nice business in your locality, it will not be taken from you and given to some one else. You get the benefit of your labors when you handle the Wahl Car.



When Writing to Advertisers, Please Mention Motor Age.

Here are the Real Facts About the Wahl Car

Never in the history of the automobile industry has so much value been given for such little money. Here at last is the realization of the prophecy that has been made for years that "some time someone would build a real motor car at a price within the reach of the poor man." Here is a car that will please the rich man, at a price that everybody can afford.

MOTOR. Four cylinders, I head, cast in pairs; cylinders, 3 1/4 in. bore, 5 in. stroke. Silent, efficient and flexible. Crankshaft of drop forged high carbon steel, valves fully enclosed.

UNIT POWER PLANT. The Motor, Clutch and Transmission are built and assembled in one unit.

CLUTCH. Nine-inch disc-type Clutch with Raybestos-lined discs. Quick, easy engagement without grabbing.

TRANSMISSION. Sliding selective type, four speeds—three forward and one reverse—quiet, smooth-running; equipped with annular bearings. Transmission and Clutch readily accessible and adjustable.

IGNITION. High-tension Bosch Magneto, set spark. Simplest and most efficient Ignition at all speeds for the expert and the novice.

STEERING. Full worm-and-gear type, Irreversible, with 17-inch Steering Wheel.

REAR AXLE. Semi-floating Salisbury, with Hyatt roller bearings. Bevel Drive and pinion of extra large size and strength, with ingeniously designed housing of great strength and light weight.

FRONT AXLE. "I" Beam Section drop-forging, drop-forged steering arms and knuckles with large drop-forged spindle.

BODY. Aluminoid steel, wood rim, flush sides, full vestibule, full doors, ample room in tonneau of touring car for three people of generous size, luxurious wide seats, with resilient, deep-buffed leather cushion.

GASOLINE TANK. 15 gallon capacity. Oil reservoir 1 1/2 gallon capacity.

CONTROL. Center control; Cane lever gear-shift, with short travel in center, with Emergency Brake lever adjacent. Right-hand steer, Clutch Pedal left, Service Brake Pedal right, Foot accelerator between them, Throttle lever above steering column.

COLOR. Blue-black. Nickel trimmings.

COOLING SYSTEM. Thermo-Syphon system, large Mercedes radiator, V type, with excess circulation, in conjunction with belt driven fan.

LUBRICATION. Constant level and force feed by pump located on the motor, furnishing continuous spray to all moving parts of the motor. Sight feed on the dash for each of the three main bearings.

CARBURETOR. Holley Model H, with hot air intake and special Holley Carburetor Air Adjustment on the dash to facilitate starting.

BRAKES. Two external contracting, two internal expanding, acting on 12-inch drums on rear wheels. Service Brake operated by foot pedal, quick acting Emergency Brake Lever at side of gear shift lever.

RUNNING GEAR AND WHEELS. Wheel base, 108 inches. Wheels, Artillery type, 32 inches, with heavy second growth spokes. Quick Detachable Rims. Tires 32x3 1/2 inches, front and rear.

SPRINGS. Front, semi-elliptic; Rear, three-quarter elliptic.

FRAME. Pressed Steel, channel section, dropped, giving low center of gravity and easy riding qualities.

EQUIPMENT. The "WAHL" cars are sold completely equipped, including the following equipment: Mohair Top, Top Envelope and Special Enclosing Curtains, Windshield, Speedometer, Dash Carburetor Adjustment, Prest-O-Lite Tank, Black Enamel and Nickel Gas Headlights, Oil Side and Tail Lamps, Quick Detachable Rims, Horn, Tire Repair Outfit, Tool Kit, Pump and Jack.

Don't wait until this big chance gets away. Write or wire today—right now. Every minute counts.

WAHL MOTOR COMPANY

3093 East Grand Boulevard, Detroit, Mich.

THE

Wahl

CAR

Stands Squarely
on Merit

5 PASSENGER
TOURING CAR
\$ 790

Both
Fully
Equipped

2 PASSENGER
ROADSTER
\$ 750

S.R.O. BALL-BEARING

MANUFACTURED BY J. SCHMID-ROOST

OERLIKON, SWITZERLAND



Boillot, First Prize

5th Annual
Peugeot Contract
worth \$400,000

(Translation)
Beaullien, July 10, 1912.
Schmid-Roost Co.,
Oerlikon, Switzerland.

Gentlemen:
Following up negotiations with you
we herewith confirm a new order for
frs. 2,000,000 net value of S. R. O. Ball
Bearings, to be taken before end of
June, 1914, according to specifications
which will follow.
The bearings shall be invoiced at
list prices with a discount of
The guarantees remain the same as
heretofore.
Please acknowledge receipt of this
order and oblige
Société Anonyme des Automob-
iles et Cycles Peugeot,
(Signed) R. PEUGEOT.

S.R.O. AGAIN LEADS

1st and Second Place

GRAND PRIX

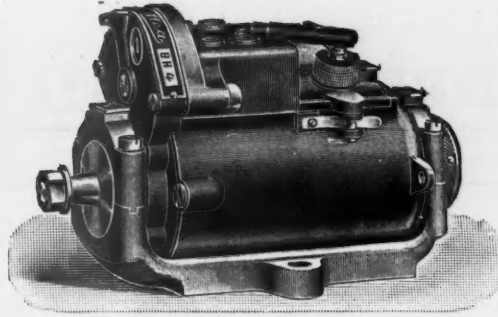
S. R. O. BALL BEARINGS

Sole Importers
MEA MAGNETOS

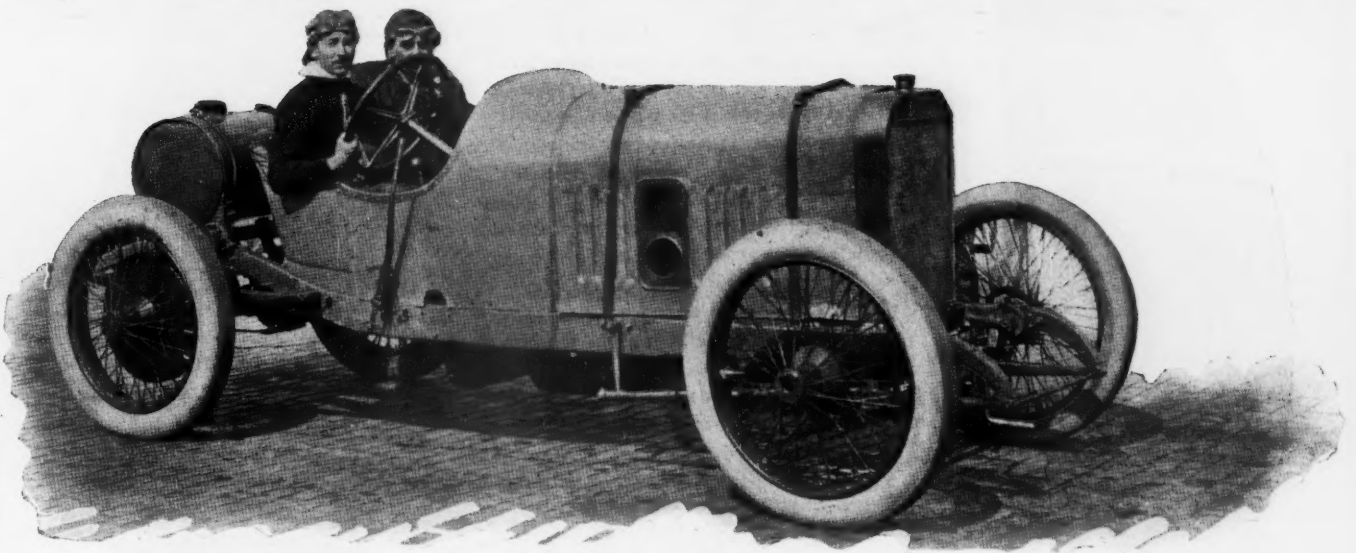
MARBURG-HAGEN SPRINGS

MARBURG BROTHERS, 1786 Broadway, New York
DETROIT TORONTO CHICAGO

MEA
MAGNETO
 MANUFACTURED IN



MEA
MAGNETO
 STUTTGART, GERMANY



Advantages of the
 Mea Magneto

Goux, Second Prize

The Mea bell shaped magnet which is shifted together with the timing mechanism insures a hot spark of the same intensity in all positions of timing.
 The Mea means smooth, quiet running on the high gear and increases comfort in automobiling.
 The Mea increases the efficiency and flexibility of any motor.
 The Mea is used on the leading cars of the world and its superiority is acknowledged.

MEA AGAIN LEADS

1st and Second Place

GRAND PRIX

S. R. O. BALL BEARINGS

Sole Importers
 MEA MAGNETOS

MARBURG-HAGEN SPRINGS

MARBURG BROTHERS, 1786 Broadway, New York
DETROIT TORONTO CHICAGO

Endurance is the supreme test Five times around the earth and still good—two hundred fifty million, five hundred forty thousand revolutions under load do not wear out

New Departure Ball Bearings

Fulwiler Electric Company

JOBBERS OF HIGH GRADE
ELECTRICAL AND TELEPHONE SUPPLIES
ELECTRICAL MACHINERY

W. J. FULWILER
MANAGER

Abilene Texas.

June 25, 13.

New Departure Mfg. Co.,

Bristol, Conn.

Gentlemen:

Am sending you by today's parcel post N. D. Bearings #210 and #307. It might be of interest to you to know the service your New Departure bearings have given. The two bearings are used on the front and rear of the transmission on a Model 16 Buick, 1910. The car has been driven a hundred and twenty-three thousand miles without a minute's trouble with the transmission and as you can see, the bearings are worn but very little, and the bronze bearing that supports the front of the main shaft was entirely gone, and this threw all the strain on the #307 bearing.

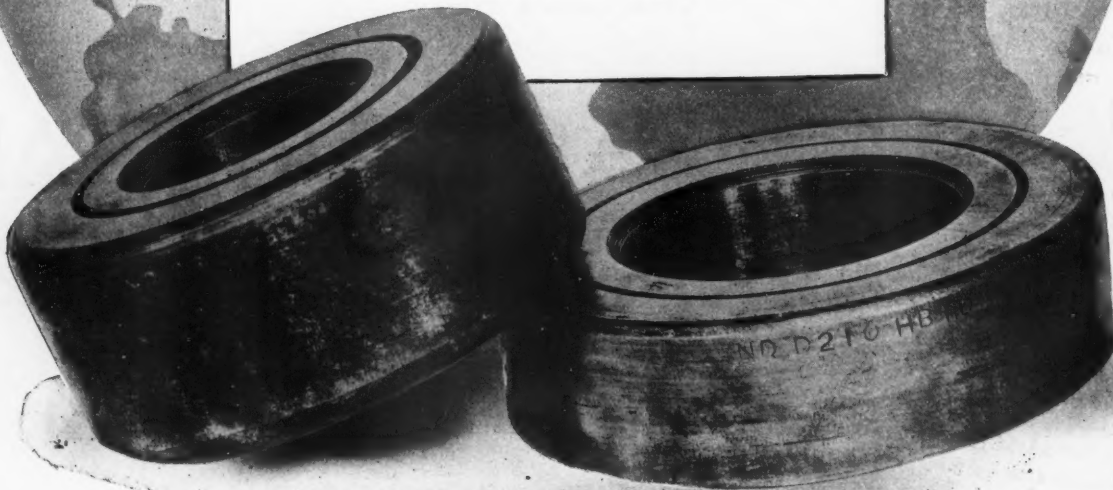
I think the N. D. Bearings would run some time yet but as I am overhauling the car, I thought it best to have them reinspected.

Thanking you for your prompt attention, I remain

Yours truly,

J. W. Carter Jr.

Foreman, Fulwiler's Garage.



During the life of these bearings, five sets of bearings of another type were worn out and replaced. New Departure ball bearings work with the least friction and, therefore, give maximum wear and service—American made and guaranteed.

Write for interesting literature

The New Departure Manufacturing Company, Bristol, Conn.

WESTERN BRANCH, 1016-17 FORD BUILDING, DETROIT, MICHIGAN

When Writing to Advertisers, Please Mention Motor Age.

Stewart Speedometer
MAGNETIC PRINCIPLE

The Real Test

The older the "Stewart" Speedometer gets—the more popular and prominent it becomes.

With over 800,000 "Stewarts" in use, as against a scant 200,000 of all other makes combined, "Stewart" superiority must be conceded.

When such a vast majority voluntarily place their unqualified O. K. on an article, then that article must be the best by the very normal and natural test of giving perfect satisfaction.

The Stewart Speedometer Factory


1931 Diversey Blvd.

Chicago, U. S. A.

Service Stations in all important cities all over the world

*The most popular
Speedometer in the World*

When Writing to Advertisers, Please Mention Motor Age.



Cole - "The Standardized Car"

Why did COLE buy the BIGGEST AD ever printed?

Why did he literally buy the most expensive advertising medium in the world by the yard?

Why did he spend \$30,000 in one smash?

He did it for—YOU

COLE has always been the strongest champion of the automobile dealer in America. Cole has always contended that the foundation of the automobile industry is the dealer, and that in order to succeed any automobile factory must consider the dealer **first**. The only time the dealers of America ever got together in a convention with the idea of figuring out how to make more money was at the call of J. J. Cole. You have possibly heard J. J. Cole say—"The secret of success in this business is building a car on which the dealer can build his own business." You have said to your factory time and again—"I could make money if you would give me a car that wouldn't consume all my profit in service." The Cole's answer is—"The **Standardized Car**"—the car made from radiator to rear axle from the best stuff in the world, and by the greatest specialists in the world—the car that **leaves** your profits with you.

Why the Six-Page Ad in The Saturday Evening Post?

BECAUSE the Post is the world's one great, permanent automobile show. Because two million people visit this show every week—most of them successful people—a great mass of men and women who **buy** automobiles from **you**. This being so, and the Cole being game to the core, and having your interest at heart, the Cole bought more floor space at this show than any automobile maker ever bought. The Cole struck a heavier blow for you than any automobile maker ever struck—for behind this blow was the tremendous force of this great standardization idea, which is exclusive with Cole; and because Cole was fresh from one of the most successful automobile years an automobile maker ever enjoyed—the profits of which were shared in by Cole dealers everywhere.

The Cole advertising campaign last season was recognized—even

by competitors—as the best campaign of the year, and it did the business. It cleaned out the stuff. On July 1st there wasn't a car left on the Cole factory floor. That's the proof of advertising. Now, the same men who did the Cole advertising last year are doing it this year—they are Cole men 100 per cent—they live Cole—they know Cole—and when they tell the unmitigated truth about Cole, prospects are bound to fall because no man can resist the **truth**.

You are a dealer. You know what this means. You know it means that these Cole motor cars were **sold**, and that the men who sold them made money. Proof—fully 100 per cent of all Cole dealers applied for renewals for the coming season. The only thing in the world which makes it possible for us to talk business with you is the fact that we have doubled our output.

Cole Dealers Everywhere Are Making Money

ASK them—ask their bankers. Now, how about you? Only your private ledger can tell whether or not it is time for you to **hook up with Cole**. If you didn't make money last season it probably was not your fault. Who knows, maybe your factory was still doing business on the old lines—putting all the burden on the dealer—making you find your own prospects, leaving you alone to fight it out with your banker, making you work out for yourself the problems of its car, leaving you alone to sink or swim.

By Cole's methods—the prospect is brought to your salesroom with his checkbook in his hand. Will you take his check, or will you let that competitor of yours across the street see the light first and take that buyer's check from you, thereby making you **compete** instead of

share with the livest-automobile organization in the industry? Perhaps this coupon is the nugget which lies above the pay dirt. Dig—fill it out. Act **now**.

COLE MOTOR CAR COMPANY, Indianapolis, Ind.

Gentlemen:—Your way of making money for the automobile dealer looks good to me. I am certainly ready to talk to any organization which is game enough to spend \$30,000 in one smash for the good of the dealer. When can I see you?

NAME _____

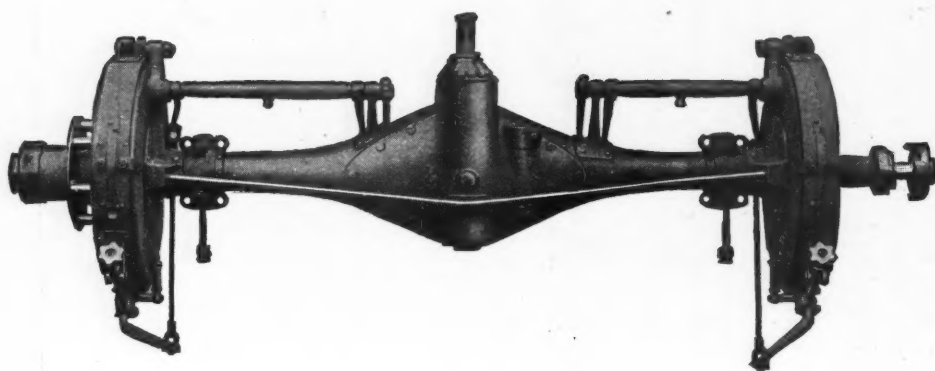
ADDRESS _____

TOWN _____

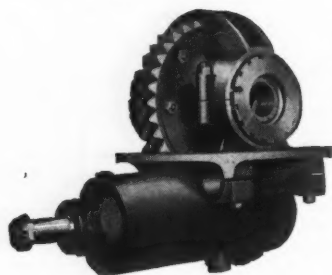


"American" Axles

With the Famous Lanchester-Daimler Worm Drive



THE WORM DRIVE—for either Gasoline or Electric pleasure cars—reaches its highest form of efficiency when the Lanchester-Daimler type of gear is mounted in a full floating *American* Axle.



The superiority of this unit will be recognized instantly. It embraces the Worm Drive that has led the development of this gear abroad, and the highest class axle in America.

The combination carries with it the assurance that only the finest and best materials have been used—and assembled by highly expert workmen.

An "*American*" Axle containing the Lanchester-Daimler Worm Drive unites the best English and American shop practice. Fitted throughout with the finest class of foreign ball bearings, it is both silent and marvelously long lived.

We hold exclusive American rights, as axle manufacturers, to the
Lanchester-Daimler Worm Gearing

THE AMERICAN BALL-BEARING CO., Cleveland, Ohio



HOLLEY

CARBURETOR

No Moving Parts
Only One Adjustment

At High or Low Speeds

You will find that the new no-moving-parts Holley is equally efficient.

Regardless of price or type, we guarantee the new self-adjusting Holley on points of easy starting, running idle, acceleration, speed, economy, general nicety of operation, taken individually or collectively, to perform better than any other carburetor on the market at this time.

Over half of the cars manufactured in the United States during 1913 will be equipped with the new self-adjusting Holley carburetor.

This output amounts to over 215,000, which is more than the combined amount of gasoline automobile carburetors made by all other companies.

If you have a car which has been in use for several seasons equipped with the old-fashioned spring valve carburetor, take it to your garage man and have him equip it with this new Holley.

The saving of gasoline alone will pay for it in a few months.

HOLLEY BROTHERS CO., 131-141 Rowena St., Detroit

AUTOMOBILE SUPPLY COMPANY, 1335 Michigan Boulevard, Chicago, Ill. OMAHA RUBBER COMPANY, Omaha, Neb.
FOREIGN BRANCH: Holley Bros. Co., Coventry, England

Holley Carburetors are carried in stock at the following addresses: CHAS. E. MILLER, Home Office: 97-103 Reade St. and 121 Chambers St., New York

BRANCHES:

New York City.....924 Eighth Ave. Between 54th and 55th Sts.	Hartford, Conn.....274 Trumbull St.	Detroit, Mich.....227-229 Jefferson Ave.
New York City.....2782 Broadway Between 107th and 108th Sts.	Atlanta, Ga.....68 Edgewood Ave.	Cleveland, Ohio.....1829 Euclid Ave.
Springfield, Mass.....Bridge and Dwight Sts.	Brooklyn, N. Y.....1421 Bedford Ave.	Philadelphia, Pa.....318 North Broad St.
	Buffalo, N. Y.....824 Main St.	New Orleans, La.....601-603 Baronne St.
	Albany, N. Y.....135 Central Ave.	Newark, N. J.....274 Halsey St.
	Boston, Mass.....202-204 Columbus Ave.	

When Writing to Advertisers, Please Mention Motor Age.

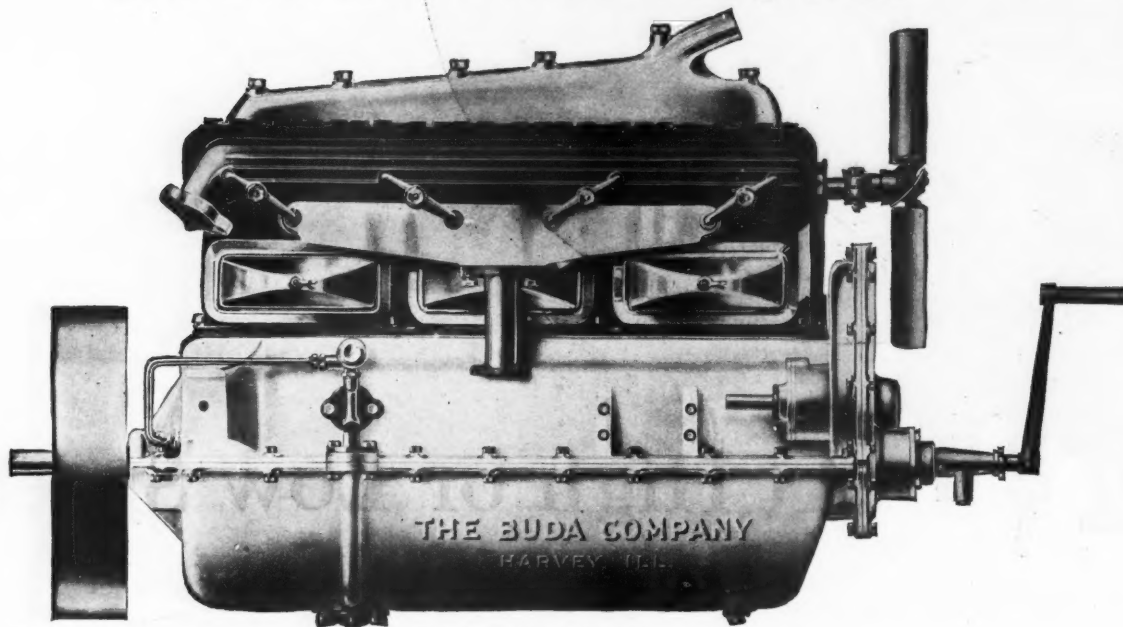
The Proud Boast of the Automobile Manufacturer

used to be: "We make every part of our car in our own factory." After they had tried it for a year or two they found out, (and *their customers* found out) that, *although a GOOD car MUST be a unit in DESIGN, it CAN'T be a unit in CONSTRUCTION.* They found out that in a GOOD automobile each essential part is a job for a SPECIALIST—one that only a specialist, concentrating *all* his thought, *all* his experience and *all* his manufacturing facilities ON ONE THING, can rightly handle.

So today the proud boast of some of the proudest manufacturers is, that following the great DESIGN of *their own great engineers*, they are building their car of this good axle, that good wheel, the other good transmission, and so on to the

PROUDEST BOAST OF ALL—

"We Use the 'Sweet-Tempered' "



Model "SS" Buda Little Six

BUDA MOTOR

"the part that sells the car"

Indeed True That

nothing speaks more plainly of Buda's superiority than the dropping by car manufacturers of their Motor Departments and the adoption of Buda Motors. The tendency of the trade is toward recognition of the fact that the *essential parts* of a motor car or truck should be the work of Specialists, not Departments.

About the best selling instructions the Manufacturer can give his salesmen or suggest to his dealers begin with: "Flip open the hood and play your strongest card first—The Buda Motor."

The car buyer has come to know all this—and WHEN . THE . CONSUMER . KNOWS . WHAT . HE . WANTS — "arguments are not in order." His educated preference is a mighty force in your favor and, to have him on your side you must give him *what he wants.* (We teach him *why.*)

See us—Ask us—Write us

THE BUDA COMPANY

FACTORY, HARVEY, ILL. (Chicago Suburb)

Address all correspondence to our FACTORY REPRESENTATIVES

BRANDENBURG & COMPANY

1108 SOUTH MICHIGAN AVENUE, CHICAGO

FORD BUILDING, DETROIT

57TH AND BROADWAY, NEW YORK CITY

1914 Specifications

Model "SS" 6 Cylinder 3 $\frac{1}{2}$ x5 $\frac{1}{2}$
Model "T" 4 Cylinder 4 $\frac{1}{2}$ x5 $\frac{1}{2}$
Model "O" 4 Cylinder 4 $\frac{1}{2}$ x5 $\frac{1}{2}$
Model "Q" 4 Cylinder 3 $\frac{1}{2}$ x5 $\frac{1}{2}$
Model "M" 4 Cylinder 2 $\frac{1}{2}$ x4 $\frac{1}{2}$

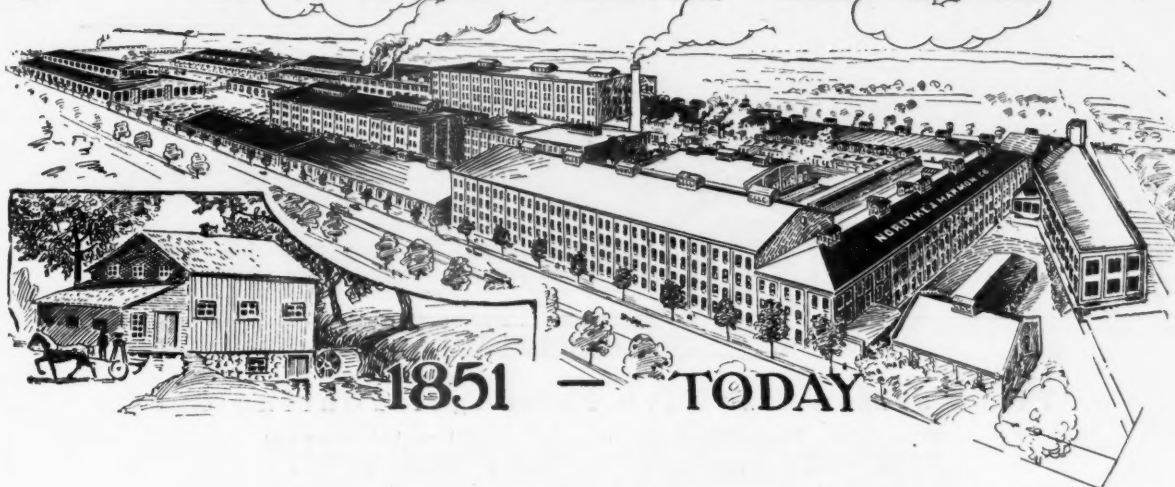
Model "SS" furnished either as separate Motor or with Bell Housing Crank Case.

Models "T," "O" and "Q" furnished either as separate Motors or with Bell Housing Crank Cases. Also either for sub-frame or main frame support.

Model "M" furnished in separate type only for sub-frame support.

"The Easiest Riding Car In The World"

MARMON



Old School Honor Plus The Efficiency of Today

Plain, old-fashioned honor has been the foundation of many industrial successes. An honest effort to make the best possible goods to meet the requirements of the purchaser, a fair price placed upon these goods and square dealing with the buying public—these are among the things covered by that one word "honor."

Twelve years before the battle of Gettysburg, Nordyke & Marmon Company began the manufacture of machinery to meet highly exacting requirements. Since then more than forty manufacturing concerns have entered the same field, some with large production and low prices, others with special methods of obtaining business and others with various propositions. Today Nordyke & Marmon Company, with no variation of its policy, is among five survivors of this varied competition. During the sixty-two years, it has never marketed a product built for cheapness or with any other end in view than the best possible service to the purchaser.

Has this "old-school honor" paid? The answer lies here—in one of the leading manufacturing institutions of the great Middle West, a concern owned by the family that founded it, a company with sixty-two years of constant, healthy growth and unimpaired credit.

In the early days of the automobile industry Nordyke & Marmon Company began to build motor cars, the best that brains, experience, money and honest intent could produce. Always abreast and sometimes in advance of the marvellous development of this new device for the pleasure and convenience of mankind, the Marmon has become known the world over as among the very few cars classed in the first grade. It will continue among the best so long as this great manufacturing institution endures.

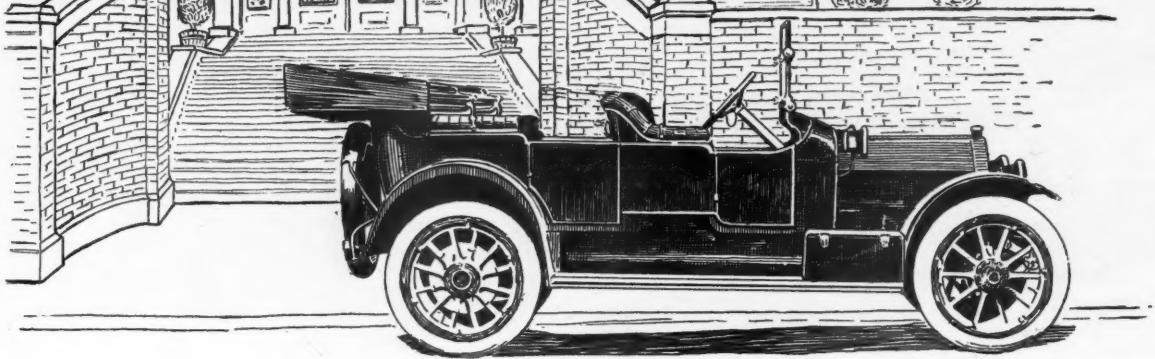
The great manufacturing plant of Nordyke & Marmon Company, equipped and organized at every point for up-to-the-minute efficiency, is open to your inspection. You cannot visit it without gaining from every department the indelible impress of years of sound, successful experience—without carrying away with you the greater confidence in the future and product of such an organization.

Nordyke & Marmon Company
Indianapolis (Established 1851) Indiana

"Sixty Years of Successful Manufacturing"

"The Easiest Riding Car In The World"

MARMON



The Marmon "32" Five Passenger Touring Car

Price, \$3,000. Four cylinder, 32-40 h. p., 120" wheel base, body types and equipment to meet every requirement. A rational, logical car for touring and city use. Years of satisfactory service have proved its economy in tires, fuel and upkeep—plus smooth, delightful operation and durability.

ANNOUNCEMENT

For the coming season the Marmon "Thirty Two" offers all the latest ideas in equipment, style and appointment.

The features of exclusive Marmon design, the scientifically selected materials and conscientious, expert workmanship, attain their highest development in this car.

The experience of sixty-two years as successful manufacturers of high-grade machinery stands back of the refinement and mechanical perfection of the Marmon "Thirty Two."

A few of its many superior features:

Marmon "32" Motor—proved the best by comparison with the finest products of European and American makers in the winning of the most arduous of long-distance races and road tours, and backed by years of consistent service in the hands of owners. 4 cylinder, 4½" bore, 5" stroke, 32-40 h. p., two spark, dual ignition system, large valves, abundant power combined with great flexibility and economy of fuel.

Lubrication—Marmon automatic force-feed, direct to bearing surfaces through hollow crank shaft. Widely copied but never equaled. Simple and reliable, reducing oil consumption and wear to the minimum.

The Most Practical Three Point Motor Suspension, Straight Line Shaft Drive, Improved Cone Clutch.

Transmission—Unit with rear axle. Simple, strong, easy of access.

Internal Expanding Brakes—Two sets on each rear wheel, 408 square inches of braking surface. Clean cut design, accessible and effective adjustment. Acknowledged by official investigation the most effective of braking systems.

Rear Axle—Marmon design and construction. Pressed steel housing, light, strong and durable. Accessible differential.

Left Hand Drive—With center control and every feature for safe and easy operation, making a car that a woman

may drive with assurance—a car that may be trusted in any emergency.

Bodies—The individual design and finish of the Marmon "Thirty Two" bodies add a distinctive tone of beauty and refinement. Distinguished in appearance, they indicate the high character of every detail of the car. They are made with every care, of finest materials, fitted with every appointment and extra deep hand-buffed upholstery. The running boards are clean, with metal boxes for batteries and tools set in front fenders.

Equipment—Electric starting and lighting system; tailor-made top with dust boot and curtains; built-in windshield adjustable for ventilation; black and nickel finished; speedometer and clock combination; electric horn with button on steering wheel; electric light to illuminate entire dash; shock absorbers front and rear; single tire carrier rear and one extra demountable rim; coat rail; foot rest; full assortment of tools, and electric extension lamp. Box in rear and compartments in tonneau provide ample storage space for curtains, tubes, pump, jack and other articles.

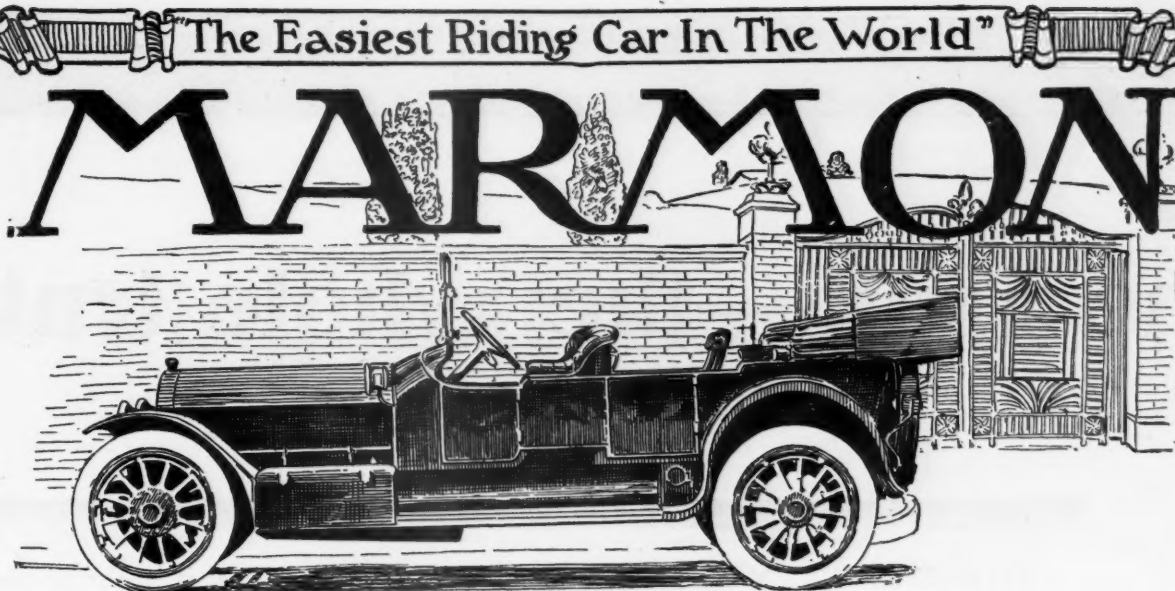
Prices—Five-passenger Touring Car, \$3000; Four-passenger Suburban, \$3000; Two-passenger Roadster, \$2900; Speedway Type Speedster, \$2850; Limousine (seats seven), \$4000; Landaulet (seats seven), \$4100; prices f. o. b. factory, Indianapolis, Ind.

Detailed Information on Request

Nordyke & Marmon Company
Indianapolis (Established 1851) Indiana

"Sixty Years of Successful Manufacturing"

When Writing to Advertisers, Please Mention Motor Age.



The Marmon "48" Seven Passenger Touring Car

Price, \$5,000. Six cylinder, 48-80 h. p., 145" wheel base with short turning ability, the old objections to long wheel base. Body types and equipment to meet every requirement. The only big car with small car advantages. Wonderful riding qualities and surpassing power and flexibility. A car developed by years of exacting tests.

ANNOUNCEMENT

The more a man knows about motor cars—the more he will appreciate the Marmon "Forty Eight."

It is distinguished by its exclusive features as the most complete, luxurious and capable of all high-powered cars.

It has abundant power in proportion to weight. It combines small car ease of operation with the comfort and luxury of big car smoothness, flexibility and easy riding.

A few of the distinctive features of the Marmon "Forty Eight."

Marmon "48" Motor—The finest example of modern motor construction—silent and free from vibration at from three to sixty miles per hour on high gear—tremendously powerful—wonderfully flexible and responsive. Six cylinders, 4½" bore, 8" stroke, two-spark dual ignition system, large valves, enclosed, silent chain connection to electric starter.

Lubrication—A further development of the famous Marmon automatic force feed, oiling system, used first in this country by the Marmon and proven successful by over ten years of service on Marmon cars. The oil is carried through hollow cam-shafts direct to the cam-shaft bearings as well as through the hollow crank shaft direct to the main bearings, connecting rod and piston-pin bearings.

Three Point Suspension, Straight Line Shaft Drive, Multiple Disc Dry Plate Clutch.

Transmission, Rear Axle and Brakes—of proportionate size and following the same general design developed on the Marmon "32" and proved by the most strenuous tests of racing on track and road and in the hands of owners.

Front Axle—One of the many exclusive features of this distinctive car. The vertical spindle is placed in the direct, center line of the wheel. It makes the safest, surest and easiest steering mechanism ever devised. It permits this 145-inch wheel-base car to be turned in a remarkably short radius—gives you all the pleasure and comfort of big car operation combined with the advantages of small car ease of control.

Simplicity and Accessibility—No other high-powered car on the market offers such freedom from complication of mechanism—gives so many aids to sure, quick and simple adjustment of working parts.

Capability—In the design and manufacture of this car, the underlying idea was to meet every requirement of the discriminating buyer, who after long years of motoring experience has come to the exacting point of knowing and demanding the best. The Marmon "48" is alike the car supreme on the fashionable boulevard or on the most tortuous road or hill that long-distance touring provides. In all-round capability no car can equal its records of performances.

Bodies—The low-hung, graceful Marmon bodies mark a new note in design, distinctly in advance of anything heretofore presented to the public. In the beauty of line, in the comfort of even balance, well proportioned springs and deep upholstery and in luxury of appointment and finish, they leave nothing to be desired. The appearance is enhanced by clean running boards. Ample storage is provided for luggage and supplies.

Equipment—Electric starting and lighting system; extra quality tailor-made top with dust boot and curtains; new type windshield, designed as part of the dash with provision for abundant ventilation; speedometer and clock; electric light to illuminate entire dash; electric step light under tonneau doors; electric emergency lamp with long extension cord; electric horn, power tire pump, shock absorbers front and rear, tire carrier rear and extra demountable rim, coat rail, foot rest, full assortment of tools.

Prices—Seven, Five, Four and Two-passenger Body Types, \$5,000; Limousine (seats seven), \$6250; Berline Limousine (seats seven), \$6450; Landulet (seats seven), \$6850; prices f. o. b. factory, Indianapolis, Ind.

Detailed Information on Request

Nordyke & Marmon Company
Indianapolis (Established 1851) Indiana

Sixty Years of Successful Manufacturing™

When Writing to Advertisers, Please Mention Motor Age.

The Truth—the whole truth—

THERE ARE ANY NUMBER OF OIL SALESMEN but it is not always easy to believe what they tell you.

THERE ARE ANY NUMBER OF OIL COMPANIES who fill the pages of the magazines with advertisements of their various oils, but it is not always easy to believe what they tell you either.

ONE OIL COMPANY prints a list of automobile manufacturers, who, it is to be inferred from the language employed, are "vigorously insisting" upon owners of their cars using this particular oil—while as a matter of fact over 70 per cent of these manufacturers have stated in reply to written inquiries that they either use or recommend an entirely different make of oil.

ANOTHER OIL COMPANY states that their oil is superior to other oils because it will not "freeze"—while as a matter of fact a motor oil is required to stand heat, not cold. A capacity to withstand cold indicates that the oil has an asphalt base, which is probably the worst thing that can be said about a motor oil.

ANOTHER OIL COMPANY states that their oil is "accurately compounded and scientifically prepared"—which means exactly nothing.

ANOTHER OIL COMPANY states that their oil contains "no carbon"—which is a physical impossibility since carbon is one of the elements of which all mineral oils are composed. (All oils must contain some carbon.)

AND THE VERY OIL COMPANY who claims to know the most and who asks you to use the oil they make because they are the world's foremost experts on lubrication, once had some brass tags printed and attached them to the motors of a certain make of automobile, advising the use of a black steam cylinder oil. They might as well have recommended a good grade of glue.

THE WHOLE TRUTH OF THE MATTER is that a majority of both those who make oil and those who sell it either know absolutely nothing whatever about it or else are not willing to be honest about it and what they say and what they print proves it.



FACTORIES:

NEW YORK.....92 Pearl St.
PHILADELPHIA.....113 Arch St.

BRANCHES:

BOSTON284 Columbus Ave.
WASHINGTON...3627 New Hampshire Ave. N. W.
PHILADELPHIA..113 Arch St. & 719 N. Broad St.

INVADER

Lessees of Chas.

Main Office, 79 Broad

-nothing but the truth (?)

These are the facts. An automobile oil is required to do two things,—(1) lubricate, and (2) burn up cleanly,—and the ability of any oil to perform these operations can be absolutely determined by the employment of a few simple physical tests.

Take the gravity test as an illustration. Everyone knows that carbon in a motor oil is objectionable, and that the amount of carbon in an oil is proportionate to its weight or gravity. The lighter the gravity, the less carbon the oil contains, and other things being equal the better the oil will be.

To ascertain which of two oils has the lightest gravity and the least carbon is easily done. Simply take two samples of oil in glass bottles (Invader Oil and any other) and pour a few drops of the other oil into the Invader Oil. If the other oil sinks to the bottom of the Invader Oil it is because the other oil has a heavier gravity—it will contain more carbon—it will not be so good an oil for automobile lubrication.

To say that an oil with low tests is superior to an oil with high tests is absurd. It is equivalent to saying that 5 pounds of iron weighs more than 7 pounds of iron.

An unsupported statement therefore, to the effect that one brand of oil is better than another means absolutely nothing. *The fact that Invader Oils have better tests than other oils, however, means everything.*

The only question which the buyer of Invader Oil has to consider is whether or not Invader is worth its difference in price. *The fact that it is a better oil cannot be contradicted.*

P. S.—I-O-C GEAR OIL is the only oil ever made especially and exclusively for the lubrication of automobile transmission gears. "It puts noisy gears to sleep."

Write for prices and descriptive booklet.

OIL CO.

F. Kellom & Co.

Street, New York

TERRITORIAL AGENTS

Boyer-Campbell Co. Detroit, Mich.
Beck & Corbitt Iron Co. St. Louis, Mo.
Motor Car Supply Co. Chicago, Ill.
Lee Hardware Co. Salina, Kans.
Electric Manufacturing Co. St. Paul, Minn.
American Lubricating & Supply Co., Kansas City, Mo.
James Bailey Company Portland, Me.



Jiffy

CURTAINS

JIFFY CURTAINS are now the recognized *standard* type of automobile side curtains.

You can have them on your car if you insist.
They are much more convenient than the old type of side curtain.
They are always ready—can be let down or put up in a "jiffy."
They permit occupants of the car to enter or leave it easily.

They allow unlimited vision in all directions.

They can be folded up and easily stored away in the top, out of the way, ready for instant use.

They do not in any way interfere with the raising or lowering of top.

Full information as to their construction, method of attachment and price furnished on application.

Read what these owners say:

"Our 'Jiffyquilt' Ford touring car has been engaged in taxi service since last November. We have had many compliments upon the improved, snappy appearance of the car, and the additional cost has been more than repaid by the increased comfort and better appearance of the machine."

"For convenience and protection I consider 'Jiffy' curtains far superior to anything else I have yet seen. We also use them on our twelve trucks."

"'Jiffy' curtains are certainly fine. By their use I can, in a few minutes, without leaving my seat, convert my touring car into a storm-proof, frost-proof limousine."

"Since using 'Jiffy' curtains I have become so accustomed to their convenience that I would not part with them for twice what I paid."

"I am very well pleased with 'Jiffy' curtains, and can fully recommend them."

"I was going to buy a limousine for winter use, but since getting my touring car 'Jiffyquilt' don't need it."

"A set of 'Jiffy' curtains certainly came in handy last evening when a sudden rain storm came up and I had my 'Jiffy' curtains up without getting out of my car. They are not only a protection against the rain, but answer the purpose of a limousine body, and you can always get out of the door readily by sliding them. They are ornamental and add to the looks of the car,

and a great improvement on old curtains. I certainly would not be without them."

"I unfastened the curtains and had them in place in a minute's time. Occupants of other cars without 'Jiffy' curtains had gotten out to put on their old-style curtains, but were driven in by a rain which was coming down in torrents. As the wind was strong, they were completely drenched, whereas, in the case of my 'Jiffy' curtains, there was hardly a drop of water touched us."

Manufacturers' Comments

"We believe the time is not far distant when 'Jiffy' curtains will be the universal standard equipment."

"We consider 'Jiffy' curtains the most practical on the market, and they have helped our business more than anything else we have handled. We know of nothing that could give better service and more satisfaction, and we recommend them highly to everyone."

"The additional appearance with plenty of light, no nuisance of broken lights, and an entirely closed and tight-fitting top which guarantees comfort to the occupants of 'Jiffyquilt' cars cannot be too highly praised."

The following manufacturers include them as regular equipment:

ABBOTT-DETROIT
CHANDLER SIX
HUPMOBILE
COLUMBIA-KNIGHT
HOWARD-SIX
HUDSON
KEETON KNOX
LEXINGTON LOZIER
LUVIERNE MAXWELL
OAKLAND PILOT
R-C-H STUDEBAKER
SPEEDWELL

STANDARD FOR 1914

PIERCE-ARROW
TRIBUNE
FAIGE-DETROIT
OPTIONAL

CUTTING FRANKLIN
HAYNES OHIO
PACKARD
STEVENS-DURYEA
WHITE
WINTON WARREN

MANUFACTURERS

Our royalty license proposition, enabling you to equip your car with Jiffy Curtains especially designed for it, should interest you. It has interested many of your competitors.

Jiffy Auto Curtain Co.

General Sales Office:

523 Ford Bldg., Detroit, Mich.

TOP AND CURTAIN MAKERS

Thousands of car-owners will welcome the chance to equip their present car with Jiffy Curtains. Our royalty license proposition enables you to fill this demand profitably.

The BOX

Educational Series—No. 8

Spark plugs are frequently damaged through careless handling before they reach the users.

In order to protect the porcelain and threads and to prevent the possible disarrangement of the spark gap, every RED HEAD Platinum Point Plug is packed in a torpedo-shaped wooden box with red, black and silver label and red top.

\$2.00 at all dealers!



Emil Grossman Company

New York — Detroit

Trenton, N. J.

London, Eng.





Extra seats, making your commercial car convertible into bus or pleasure car

Pleasure Car Dealers! Fill in Your Slack Months Selling The Brown Commercial Car

Six months in every year—from August to December—pleasure car sales are at low ebb. You can tide yourself over this slack season by selling a truck that is in demand **all the year 'round**. You can “round up” truck prospects in the months you have little else to do—**convince and sell them**. All you need is the **right truck at the right price**.

The big demand today is for trucks of about 1500 lbs. capacity. Their upkeep is exceedingly lower—they wear out fewer tires and use less fuel—than trucks of greater weight. This is a big point to business men in the market for **rapid, economical delivery service**.

Note these Features

Long Stroke Motor.
Unit Power Plant.
Center Control.
Left-side Drive.
Internal Gear Drive.
Tubular Propeller.
Cushion or Pneumatic Tires.
Large Loading Space.

The BROWN COMMERCIAL CAR has 1500 lbs. capacity. Yet it is as powerful as a 1½ ton truck. Because its parts are as heavy and strong as those generally found on 1½ ton trucks it can be safely loaded far in excess of its capacity.

We have some good territory not yet assigned. Write or wire us for generous sales proposition.

Let us send you full specifications and complete descriptions of this sales-pulling car.

Brown Commercial Car Co.
PERU, INDIANA

Indianapolis Office, 450 North Capitol Blvd.

Prices of Models

Chassis\$1650
Standard Express Body. 1775
Standard Express Body,
with top... 1825
Standard Express Body,
with screens 1850
Panel Body.. 1850
Stake Body.. 1800

Kant-blo

TRADE MARK

Self-Vulcanizing Tire Innerliners

An Absolutely Guaranteed Non-Puncturable, Non- Blowout Innerliner

They enable you to secure the greatest possible mileage from your tires. Thousands of motorists are getting from 7,000 to 15,000 miles' service from new casings, and from 1,500 to 3,500 miles from old casings almost ready to discard, by using KANT-BLO Self Vulcanizing Innerliners.

KANT-BLO Innerliners give you the mileage service of 2 tires at the cost of one. Tires which carry them hold up, down to the very last thread.

Only because KANT-BLO Liners are absolutely **different** in construction is it possible to guarantee them. Between 2 layers of highest grade fabric is a layer of specially treated **chrome leather**, tough enough to turn any nail or other sharp instrument.

KANT-BLO Innerliners are not endless like other innerliners that fit your casings only when first applied. Because of their lapped-end construction they conform to the shape of the casing at all times.

KANT-BLO Innerliners reinforce the tire at every point. They have absolutely no effect on resiliency. They are the only innerliner on the

market that is **cooling** to the inner tube. They **cost** more than ordinary innerliners but they are **worth** more.

They are made only of the best material obtainable. They are most economical in the long run. They can be used over and over again.



Note Invulnerable
Chrome Leather
Reinforcement

Write for Prices and Details.

Hampton Mfg. Company
1520 W. Washington St., Indianapolis, Ind.

When Writing to Advertisers, Please Mention Motor Age.

Read This Money Back Guarantee

KANT-BLO Self Vulcanizing Innerliners are guaranteed to fit the tire perfectly, to be free from all defects in material or construction, and not to creep, chafe, buckle or damage any tube.

They are guaranteed to prevent all blowouts and 90% of all punctures.

They are guaranteed to reduce tire expense per mile and to give absolute satisfaction or your money refunded.

The KANT-BLO Innerliner is the only innerliner sold that is **guaranteed** to reduce tire expense.

Can You Afford to Be Without Them?

If KANT-BLO Innerliners will do all we claim for them you wouldn't be without them at double their price. If they don't do all we guarantee them to—you get your money back.

You can't lose one way or the other.
Let us convince you.

Kant-blo
TRADE MARK

You are paying for KANT-BLO Innerliners every day you do without them. You are paying for them in short mileage—in tires that give out before they are worn out. KANT-BLO Liners add very little to the cost of a tire, but add very much to its service. Better begin now to halve your tire upkeep and double your mileage.

The
AV
 (A. VERMERSCH & CIE)

**The Small, Compact,
 Efficient, Hydraulic-
 Spring SHOCK ABSORBER**

"Made like a gun"

"Rides like a motor boat"

At last a hydraulic-spring shock absorber that is only 7½" high and produces the maximum of car economy and comfort.

The A.V.
 (A. Vermersch & Cie.)
**Shock
 Absorber**

Front and Rear

For both pleasure cars and commercial vehicles. A combination of the best features of hydraulic and spring shock absorbers, together with the most advanced improvements.

\$35 Per Pair and Up

Made in France and sold with remarkable success throughout Europe.

An opportunity to handle the A. V. Shock Absorber is now open to dealers and jobbers throughout the country.

HUDSON EXPORT & IMPORT COMPANY
 140 West 42d Street, NEW YORK CITY

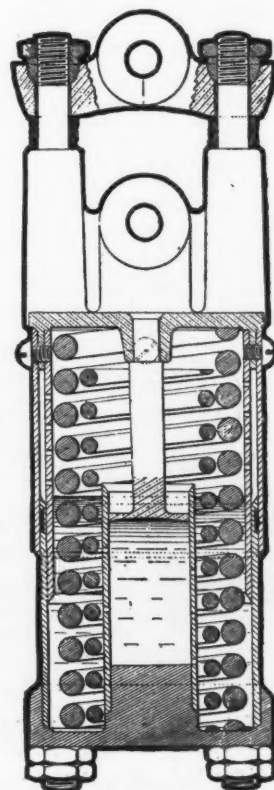
RHINELAND MACHINE WORKS

1254 Michigan Avenue, CHICAGO, ILL.
 650 Woodward Avenue, DETROIT, MICH.

JOHN V. WILSON COMPANY

1424 Vine St., PHILADELPHIA, PA.
 220 Motor Mart, BOSTON, MASS.

When Writing to Advertisers, Please Mention Motor Age.



MAYO SPARK PLUG PUMP

\$10

During the sweltering hot month of August we are going to let you try this pump

FREE
On Your Car for 30 Days

Take it on your touring trip with you. Try it out any way you will. If at the end of 30 days you think that you would ever care to return to the back-breaking, perspiration streaming job of hand-pumping, *simply send back the pump.*

We are making this demonstration offer because we know that to see and use a MAYO *once* is to *get* one. Write for full particulars.

Weight 2½ lbs.—Pumps pure fresh air only—Adapted to any size car—Instantly attached by substituting for any convenient spark plug—Built with metal rings like your motor, and will last as long—Furnished complete with 12 ft. of hose and connections.

Price \$10.00 (With Pressure Gauge)
\$2.00 Extra

Mayo Manufacturing Co.
55 East Eighteenth Street
Chicago, Ill.



When Writing to Advertisers, Please Mention Motor Age.

KOEHLER COMMERCIAL CAR

CARRYING CAPACITY 1600 ^{LBS.} PRICE \$750.

Dealers—This is Your Opportunity to Get in the Truck Business Right!

Certain Factors Are Highly Desirable for Dealers Starting in the Truck Business.

It is Necessary to Secure a Car—

- 1—Which is adaptable to almost every line of business—giving a wide field in which to operate.
- 2—Which is of low price and only one model—thus requiring but a small investment.
- 3—Which has a reputation for economy of maintenance and large carrying capacity. These are strong selling points.
- 4—Which is easy to operate and simple in construction. This avoids trouble, expensive repairs and creates a good reputation.

You Get Each and Every One of These in a

KOEHLER COMMERCIAL CAR

This car will make big money for any live dealer of push and energy. Get the agency for your town.

SPECIFICATIONS:

Motor—24 H. P., two-cylinder, water-cooled; Carburetor, Model L Schebler.

Lubrication—Positive mechanical and integral.

Ignition—High-tension Bosch Magneto; no batteries or coils.

Transmission—Planetary; all gears genuine chrome-nickel steel which, together with bevel drive and differential gears, run in constant oil bath.

Wheels—36 inch front and rear.

Tires—2½ inch, solid, fitted on demountable rims.

Wheelbase—90 inches.

Tread—58 inches.



WRITE AT ONCE FOR FULL PARTICULARS

Address all correspondence to

H. J. KOEHLER S. G. CO., 1709 Broadway, New York, N. Y.

1914 WESTCOTT SIXES AND FOURS 1914

the cars that are honor bound to be good

NOW READY FOR DELIVERY

THE HONOR OF THE FAMILY. The most valuable asset of the Westcott Motor Company is the family name, inherited from the Westcott Carriage Company, which was established almost half a century ago. The Westcotts have always built well and their greatest pride is in their reputation for good building.

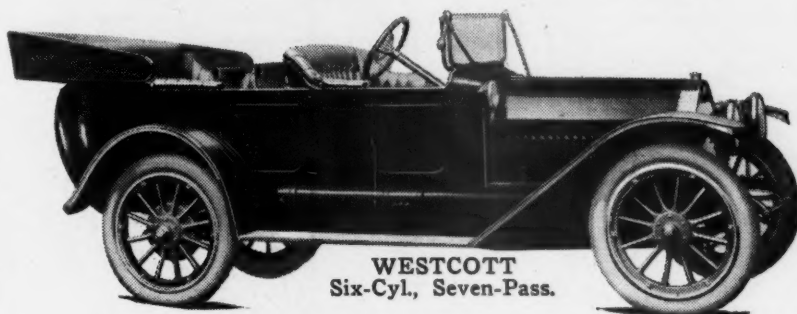
Westcott Cars Are as Good as Their Best Parts

Each individual part of the WESTCOTT is made by the world's conceded best specialist in that part. All the names associated with WESTCOTT cars are big names. The WESTCOTTS are their own specialists in luxury and finish details, their long experience giving them front rank in these lines.

All working parts of Westcott cars are concealed from sight but are so easily accessible as to cause even their drivers to marvel



WESTCOTT
Four-Cyl., Five-Pass.



WESTCOTT
Six-Cyl., Seven-Pass.

Note the many refinement features, including absolutely dustproof top cover, clear running board, scuff leather protection beneath the four doors, leather-covered back of front seat, etc. Tire irons are rigidly fastened to frame in rear.

Brief Description 1914 Westcott Six and Four Cylinder Models

WESTCOTT Six-Cylinder

WESTCOTT-Teetor enbloc motor, 67 h. p.; 100 per cent. efficient electric starter and lights that are operated entirely separate from ignition system. 128-inch wheel base, Timken axles, Warner transmission and steering gears; straight line body, which is luxuriously upholstered.

Cars are made in three types: 7-passenger, \$2,535.00; 5-passenger, \$2,485.00, and 2-passenger, \$2,485.00.

REGULAR EQUIPMENT—Top envelope and side curtains, which fasten on the inside of the bows and are numbered; wind shield, electric horn, speedometer, electric lights, portable lamp, fuel gauge, cocoa mat, coat rail, foot rest, tire carrier and full set of tools.

WESTCOTT Four-Cylinder

WESTCOTT-Rutenber motor, 48 h. p.; 100 per cent. efficient electric starter, and lights which are operated entirely separate from the ignition system. 120-inch wheel base, Timken axles, Warner transmission and steering gear, Firestone demountable rims; straight line body, which is luxuriously upholstered.

REGULAR EQUIPMENT—Same as on six-cylinder.

Cars are made in 5, 4 and 2-passenger types. Price \$1,985.00 on all models.

We can guarantee deliveries on any WESTCOTT model ten days after receipt of order

Literature fully describing all 1914 Westcott cars will be mailed on request

Westcott Motor Car Company, Richmond, Ind.

You need this book

IT IS A PRACTICAL BOOK, Simple as the A B C's, written by A. L. Dyke, publisher of the first practical treatise on automobiles in America.

This revised and enlarged 1913 Edition, just out, is especially prepared for those who want to learn the principle and construction of all parts of all cars, thereby enabling you to make repairs and adjustments in an intelligent manner.

This book explains the principle and construction of all the different ignition, carburetion, cooling and lubrication systems, together with the different types of engines and their valve systems; how to set valves, time the ignition, etc.

THE DIGEST OF TROUBLES is very complete—by turning to the index the CAUSE and REMEDY of the trouble is given.

THE ADJUSTMENT AND REPAIR SUBJECT is probably the most interesting. The subject of repairing begins with cleaning a car; cleaning carbon, chemically and mechanically; grinding valves; testing compression; taking up lost motion in valve stems and plungers; setting valves and timing the ignition; how to set all leading magnetos; scraping bearings; how to test for knocks and how to locate them; meshing the timing gears; fitting piston rings; carburetor repairs and adjustments; rewiring a car; ignition troubles and remedies; timer troubles

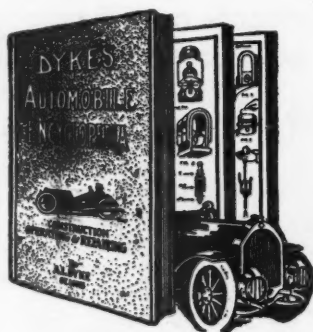
and remedies; cooling troubles; how to clean and repair radiators; how to take up wear in differential; how to adjust the steering device; how to treat the clutch; lining up wheels, etc.

OTHER SUBJECTS—such as Building a Garage for Home or Business; Equipment of a Shop; Tires; Tire Repairs; Vulcanizing; Lighting a Car; Self-Starters; the Assembly of a Car; Transmission; Axles; Brakes; Differentials; Laws; Insurance; Metric Measurements Connected with English Measurements; Care of a Car.

ANOTHER FEATURE OF THE BOOK is the building-up process of a car, from the axles to the body; each part is added by means of progressive charts: First the springs are mounted on the axles, then the frame, then the power plant is mounted on the frame and each and every part is added until the car is completed. In this manner the reader learns the relation

of one part to the other. The engine and transmission are assembled in the same manner.

THIS BOOK IS DIFFERENT. The matter is arranged in the form of instructions, of which there are 40. The type is clear. There are over 1000 illustrations, in the form of large, clear charts, of which there are 239. The reading matter is so clearly worded, a ten-year-old boy can understand.



Price ^{Postage} _{Prepaid} \$3.00

Address Book Department, CLASS JOURNAL CO., 910 S. Michigan Avenue, Chicago

KINGSTON

A 1913 Carburetor for 1913 Cars

AS opposed to other Carburetors with their hundreds of combinations of several adjusting screws and their innumerable mechanical intricacies, the KINGSTON New Model Y stands forth as a perfect carburetor built in a simple way.

Nothing appeals more to the mechanical common sense of the motorist than this simple, economical, trouble saving construction of the

KINGSTON

Everybody appreciates the invariable accuracy of a ball valve. Scientists and engineers the world over use it in the construction of instruments which are useless unless they are accurate. Upon this floating ball principle the economy, power and reliability of the KINGSTON Carburetor depends. Four floating bronze ball valves regulate the auxiliary air supply, reliably and invariably give the proper mixture in the proper proportion for every motor speed, under every possible condition of road and weather.

May we further demonstrate to you other features and advantages?

Made by the
Oldest Manufacturers of Carburetors in America
ESTABLISHED 1895

Byrne, Kingston & Co., Kokomo, Ind.

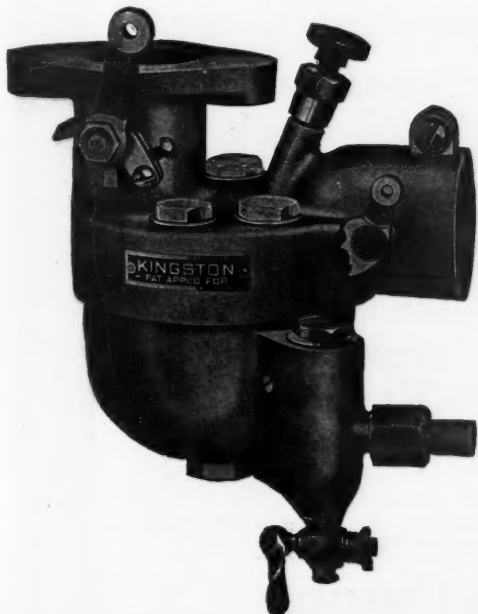
BRANCHES

CHICAGO
1430 Michigan Ave.

DETROIT
650 Woodward Ave.

NEW YORK
1733 Broadway

LOS ANGELES
804 So. Olive St.





An Invincible Combination

Kelly Trucks

Backed by

Kelly Service

This is the greatest combination in the motor truck field.

Kelly Trucks are built just right.

Their design is the result of seven years of uninterrupted observation of the natural evolution of the successful commercial car.

They are the last word in motor trucks.

That's why Kelly Trucks will do your hauling *just a little better*.

Kelly Service insures 100% truck efficiency. Our interest in a truck does not stop with its sale.

You are interested! Write us!

Dealers!

There is still some desirable Kelly territory open. Write us for our agency proposition.

**The Kelly-Springfield
Motor Truck Company**

806 Burt Street

Springfield, Ohio

(54)



Price, \$15.00

Over 49,000 Ford Owners Have That
SATISFIED FEELING



Because They Use The
Master Vibrator

which gives

A Hotter Spark More Power
A Smoother Running Engine
Less Carbon Deposits Easier Starting
Cleaner Spark Plugs



An honest article at a fair price—large, powerful condenser, genuine solid platinum-iridium points of generous size, strongly built kick switch—

The Standard By Which All Others Are Judged

OUR GUARANTEE—Try the K-W Master Vibrator for 30 days and if you can get along without it, return it and we will give you your money back and ask no questions.

SEND FOR DESCRIPTIVE FOLDER.

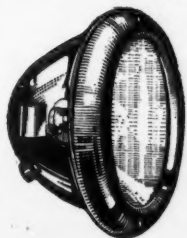
Improve the efficiency and appearance of your car by installing a



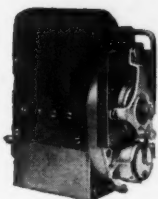
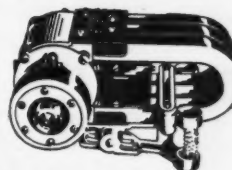
Electric Headlight Outfit \$40

Complete Outfit, Electric Generator, Headlamps, Switch, Wire and Bulbs.

Ford Outfit For Fly-Wheel Magneto, \$15.00



The K-W Generator can be easily installed on any car having exposed fly-wheel or other convenient place to belt or friction drive the Generator. This is the most simple, efficient and economical electric headlight outfit on the market. If you have lamps we can furnish you with the generator for \$25.00. Send for illustrated folder.



The K-W High Tension Magneto

The strongest made for the largest engine made. Positive results and entire satisfaction guaranteed. Give description of engine and ask for price. You can't make an engine too big for the K-W. No batteries needed to start.

WE PREPAY THE EXPRESS all the way on the K-W Master Vibrator and East of the Mississippi River on all our other goods when cash accompanies the order.



Give the
Street Number →
Agents in principal cities.

2835 CHESTER AVE.

CLEVELAND, OHIO, U.S.A.

NEW YORK, E. J. Edmond, 1783 Broadway.

BOSTON, W. J. Forbes, 243 Columbus Ave.



The road to sales efficiency

THE fundamentals which make for practical and economical sales efficiency are saleable product—plus a complete and comprehensive organization—plus broad and effective sales, merchandising and advertising methods. The Willys-Overland Company have, beyond doubt, the most complete organization in the industry—and for 1914 it will be made larger.

The Willys-Overland Company conduct the largest and most effective advertising campaign in the industry—and for 1914 it will be made larger.

The Willys-Overland Company have, from year to year, marketed the most saleable and most non-competitive car in the industry—and our 1914 value will be even more unusual in its features and its price than ever before.

The dealer who waits and connects with this 1914 line-up will establish a business and build for himself a future that is profitable, and which is free from the annoyances and disappointments caused by the natural drawbacks of handling a non-staple line.

We announce August sixteenth.

Wait.

The Willys-Overland Company

Toledo, Ohio

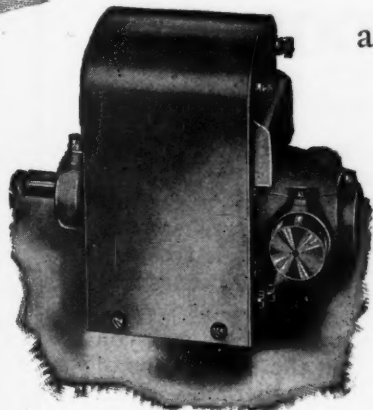


Footwork or Headwork

Which Way Is Yours?

GET A Wells Generator

and guarantee yourself better light and **no** upkeep cost.



The genuine "Wells" has only **two** moving parts, weighs only 19½ lbs., so will out-last your car.

Any old generator will make some current, but **only the WELLS** will **always** give you enough and **never** too much, because

Only The Wells Generator Has The MAGNETIC SHUNT

(the thing that does the trick) instead of a lot of delicate contraptions that (sometimes) cut in and cut out the battery. The Magnetic Shunt is just as simple and strong as the hinge on a door (and no more able to get out of order). The battery is **never** cut out. No "ifs" or "buts" about it. When the **Wells** Generator is working the Wells Magnetic Shunt has **got to work**, or break the laws of Nature itself.

Write For Name of Nearest Wells Agent

How to Take Care of the WELLS Generator:

Clamp on the lid, and forget it.

When you want light, sit still, touch the switch and laugh at the fellow who still has to pile out of the car and 'scratch' for it.



Or If You Own A FORD

"the headwork way" means a genuine

Wells Master Vibrator

You don't know what your little engine will do and you never will until you have quit trying to keep four adjustments in tune and have got a genuine Wells Master Vibrator. "On" or "off"—that's all there is to it. And it delivers that little old spark right at the "psychological moment" every time.

Don't Guess—it's worth while to Find Out.

Write For Name of Agent Near You

R. C. Wells Manufacturing Co.

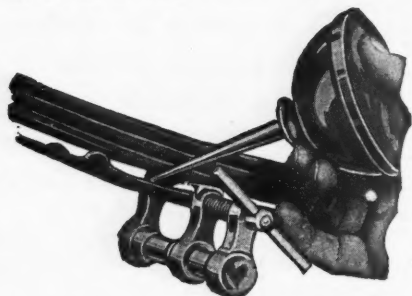
Fond du Lac,

Wells Building,

Wisconsin

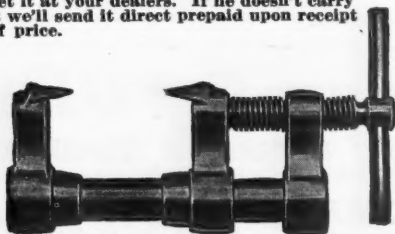


The BIGGEST TIME and MONEY SAVER in your TOOL KIT



Price \$1.50

Get it at your dealers. If he doesn't carry it we'll send it direct prepaid upon receipt of price.



Knowlson's Spring Leaf Lubricator

The only reason why there are springs on your car is to make riding easier. You wouldn't for a moment think of riding on a solid piece of steel. But that is exactly what you do when you allow the leaves of your springs to rust and stick to one another. That is what causes your car to ride hard. That is why squeaking occurs and breakages become frequent.

No doubt you have had all of these troubles and you have intended to get rid of them. But the only means of doing so was by cold chisel and hammer method—which to your sorrow you have found to be decidedly unhandy and very troublesome. In some cases even much damage has been done to the springs by this inaccurate method.

But now lubricating the leaves of your springs becomes as easy as lubricating the axles. KNOWLSON'S SPRING LEAF LUBRICATOR not only saves you time by facilitating the work of spreading the leaves of the springs, but it actually saves you money. It is the handiest tool in your kit. You merely adjust it to the springs, turn the handle, and with a jack knife or oil can spread the grease on the springs.

Every KNOWLSON'S SPRING LEAF LUBRICATOR is made of the highest grade drop forging, nickel-plated, polished and well finished. It fits easily into the tool kit, weighs less than a pound and is readily adjusted on any automobile springs.

We guarantee this tool to be satisfactory in every way or your money will be returned.

SPRING LEAF LUBRICATOR COMPANY
1004 Forest Avenue Ann Arbor, Michigan

COUPON M.A.
SPRING LEAF LUBRICATOR COMPANY,
1004 Forest Ave.,
Ann Arbor, Michigan.

Gentlemen:
Enclosed find \$1.50 for one KNOWLSON'S
SPRING LEAF SPREADER, to be sent pre-
paid. I can return this if not satisfactory.

.....Send me your dealer's proposition.

Name

Address

City..... State.....

Speedwell "Six"

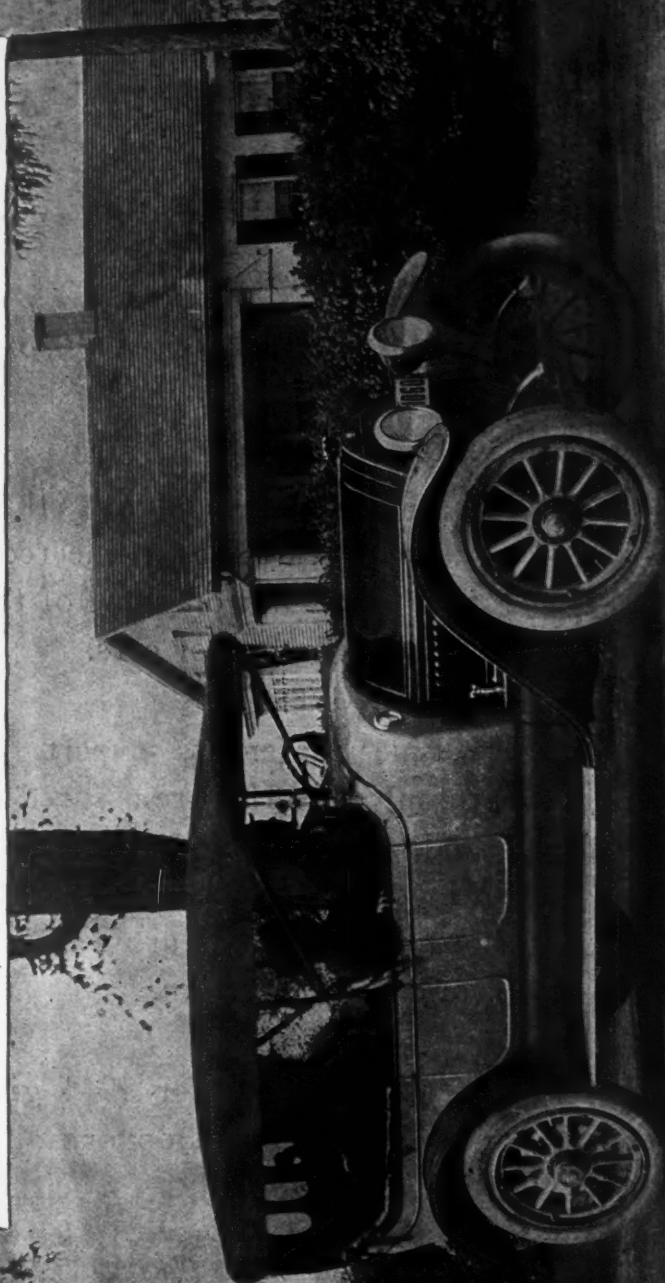
Reliability — Comfort — Appearance

Where can you buy more real value at any price?

4 and 5 Passenger, \$2850
7 Passenger, \$2950

Electric Lighting and Starting, Complete Equipment

THE SPEEDWELL MOTOR CAR CO., Dayton, O.



Metal Products Axles

Light in Weight, Silent, Unusually Rigid

THESE are the qualities that have given Metal Products Axles a fine record for long wear and satisfaction on some of the best known and most popular motor cars.

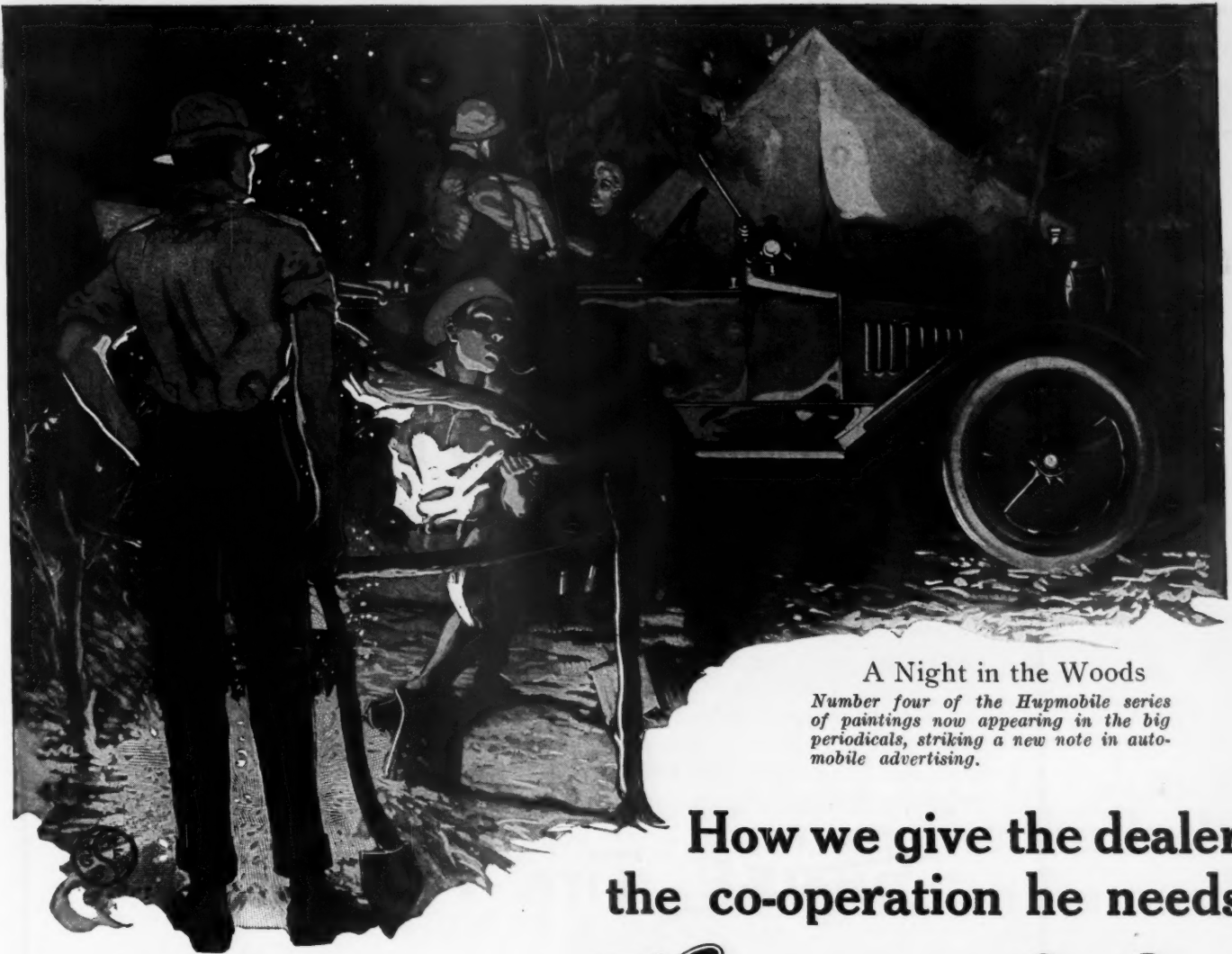
Fine materials, expert workmanship and prompt deliveries are assured to buyers of Metal Products axles. You can get either standard types or made-to-specifications axles. Our pressed steel housing type rears are well known and give exceptional satisfaction.

Open capacity for 1914 gives discriminating manufacturers the opportunity to contract for highest grade axles for either gas or electric pleasure cars.

Don't fail to talk over your proposition with us before placing your contract.

Metal Products Company

Detroit, Michigan



A Night in the Woods

Number four of the Hupmobile series of paintings now appearing in the big periodicals, striking a new note in automobile advertising.

**How we give the dealer
the co-operation he needs**

Hupmobile "32" Touring Car

\$1000 f. o. b. Detroit

In Canada, \$1180 f. o. b. Windsor

Four-cylinder motor, cylinders 3/4-inch bore by 5/2-inch stroke, cast en bloc. Unit power plant.

Selective type transmission, sliding gears.

Irreversible, screw and double nut steering gear.

Full-floating rear axle.

Twelve by two-inch brakes, external contracting and internal expanding.

Wheelbase, 106 inches.

Tires, 32x3 1/2 inches.

Equipment of windshield, mohair top with envelope, Jiffy curtains, speedometer, quick detachable rims, rear shock absorber, gas headlights, Prest-O-Lite tank, oil lamps, tools and horn.

Finish, black with nickel trimmings.

"32" Roadster.....\$1000
In Canada \$1180

"32" Six-Passenger.....\$1200
In Canada \$1430

"20" H. P. Runabout.....\$ 750
In Canada \$850

F. O. B. Detroit, or Windsor, fully equipped

Hupmobile

The man who sells the Hupmobile enjoys advantages which are as helpful as they are unique.

He has a car that is practically without competition; and he has back of it and back of him, a most complete system of advertising and sales co-operation.

Perhaps our ideas of the dealer's relation to the factory differ from those that usually prevail at the factory; but we firmly believe, from our experience that they work to the benefit of both dealer and manufacturer.

That is why we endeavor to fill the dealer with the spirit that imbues the entire factory organization.

That is why we want every Hupmobile dealer to feel that he is a member of the Hupmobile family—not merely a selling representative with the task of disposing of a number of cars alone and unaided.

We want every Hupmobile dealer to have the benefit of our selling experience and our sales ideas and methods.

We spend thousands of dollars annually to advertise the Hupmobile in the most forceful way we know, to the greatest number of people.

We spend other thousands in sales suggestions to our dealers for a house journal that dealers prize highly for its merit, and in maintaining a field sales and service organization that is constantly in touch with Hupmobile dealers throughout the country.

That is our part of the work; and that it is performed and appreciated is evidenced by the co-operation we get from the dealers and in Hupmobile sales.

Team-work counts biggest and best in any business; and team-work is the keynote of the Hupmobile organization's efforts.

Hupp Motor Car Co., 1228 Milwaukee Ave., Detroit, Mich.

Canadian business handled by Hupp Motor Car Co., Ltd., Windsor, Ontario

When Writing to Advertisers, Please Mention Motor Age.

Every Auto Supply Salesman ought to read this advertisement

SALES MANAGERS:

You will find it to your advantage to impress these facts on the boys who sell the goods.

The one accessory that the motorist *must* buy from you.

Look over your stock. How many accessories of real utility do you see which are not furnished in one form or another with the car?

Shaler Vulcanizers stand pretty much alone, don't they?

A reliable vulcanizer is a necessary part of **every** motorist's equipment. Tire trouble is the motorist's weak point. It's easy to sell him something that will eliminate it.



The Vul-Kit - - - - - \$2.00

SHALER Tire Vulcanizers

There are Shaler Vulcanizers for every requirement, from the \$2.00 Vul-Kit for mending a tube puncture now and then, to complete plants for public garages. They are made by the largest exclusive vulcanizer manufacturers in the world, a concern that devotes all of its energy to making reliable tire repair equipment.

An Accessory that Sells Easily

Any motorist can see at a glance how a Shaler will save him time and money; how it will make him independent of the repair shop. It will solve his tire repair problem at very little expense. He doesn't need to be an expert to do the work. Elbert Hubbard says, "A cascaret has nothing on my Shaler."

How to Sell Shalers

Most motorists are familiar with Shaler Vulcanizers in a general way because they have read our advertisements. When they come in and complain about their tire troubles it's up to you to suggest a Shaler as the sure remedy. Don't wait to be asked. Spring it on your customers. Sell vulcanizers to them with the understanding that it's a "make-good-or-money-back" proposition.

Special Notice to Salesmen:

If you haven't a copy of "Hints to the Busy Salesman" don't fail to write for it at once, stating what concern you are connected with. "Hints" is an interesting little book that will help you sell more accessories for your house. Nearly 5,000 accessory salesmen are carrying it. Get your copy postpaid for the asking.

C. A. SHALER CO., 229 Fourth Street, WAUPUN, WIS.



Mr. Dealer:

Where are your profits?

Have they gone in trying to push a car the public did not want?

Have they gone in an attempt to furnish service which was not built in the car you were selling?

Did you have a contract which gave the dealer a chance to make money?

Did the factory with whom you were doing business lose interest in you and your customers after the drafts were paid?

There Is a Reason Why

Premier dealers more than doubled their sales in 1913.

The answer is found in the car backed by the co-operation of the factory and satisfied customers.

The policy under which they operated, the goods they sold, the service they are able to give their customers will double their business again in the season of 1914.

Are you interested in knowing how these dealers doubled their business?

We can tell you and will gladly do so.

Premier Motor Mfg. Co., Indianapolis, Ind.

Price Cutting Proves

THE MAKER KNOWS, always has known, the real value of his car.

NO MATTER WHAT PRICE he set on it in the first place, the price at which he is willing to sell it when cornered with a lot of cars on hand—that price represents the real value of the car as he knows it.

THESE FEW WORDS apropos the fact that while we have sold our entire 1913 output of Maxwell 50-6's at the regular price (\$2350.00 plus the freight), other makers who began the season with a higher "list" are now cutting frantically to close them out before this season becomes next.

THIS CUTTING DOESN'T indicate a falling off in demand for cars. Not at all. Maxwell 50-6's sell freely. Last car of present series left the factory last Friday.

IT DOES INDICATE, however, that the buyer is getting wise on the subject of quality and a fictitious "list" price no longer misleads the judicious. PRICE OF MAXWELL 50-6 1914 series will be higher. Same car. You will be able to detect the refinements only with a microscope.

MORAL IS—A car is worth just what it is worth, in season or out, December or July.

OUR 1914 ANNOUNCEMENT will be out sometime in August. Watch for it. Meanwhile there is not a Maxwell 50-6 car—new—to be had.

Maxwell Motor Company, Inc.
Detroit

Contracts Now Being Made for 1913-1914 Agencies

Model 36-42
5-Passenger
Touring—
Fully Equipped



Glide

\$1690

The Car That Looks and Acts the Thoroughbred It Is!

The man about to buy a car or the dealer contracting for deliveries is doing himself an injustice if he does not fully investigate the *Glide* 36-42 before deciding on any make car, regardless of price.

The *Glide* is a big, roomy, powerful five-passenger car that possesses features of construction and equipment rarely found on a machine selling for \$3,000 and upwards.

If you've got a wrong impression of the *Glide* because it sells for only \$1690, read a brief outline of the car given here and you'll see that the *Glide* is not a "cheap" car; but, in the strictest sense of the word, that it is a car of quality.

Automatic Dynamo Lighting System
Unit Power Plant
Long Stroke Motor with enclosed valves
Left Side Drive
Electric Side Lamps in Dash
Floating Rear Axle with Pressed Steel Housing
Self-Starter

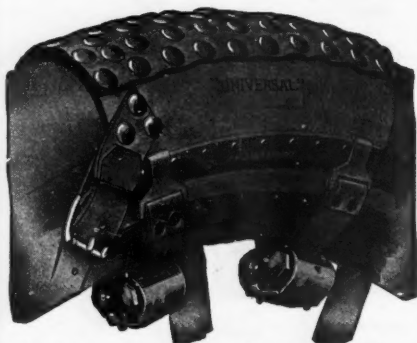
Demountable Rims (Baker Bolted-on)
118-inch Wheel Base
Motor-Driven Tire Pump
Center Control
Electric Headlights and Tail Lamp
Goodyear No-Rim-Cut Tires

Thousands of these cars are running season after season with entire satisfaction to the owners and with no responsibility to the dealer.

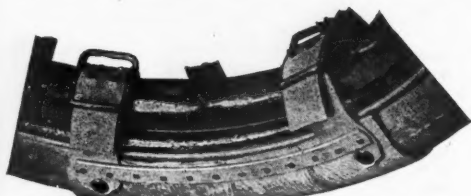
Dealers are rapidly applying for agency contracts to sell the *Glide* through 1913-1914 season, but there is still much desirable territory, which we will assign to those who are prepared to represent us intelligently and aggressively. Write for catalog, agency proposition and full information.

The Bartholomew Company

215 Glide Street, Peoria, Illinois



The Universal Ratchet Anchor Quick Repair Boot.



Universal Quick Repair Boot Junior, Adjustable Inflation Boot.



Universal Armored Clincher Boot.

"Universal" Quick Repair

THREE LEADERS; A REAL "QUICK REPAIR" BOOT For Every Emergency, To SUIT EVERY PURSE.
A REAL REPAIR BOOT May cost a little more than "A BLUFF," But is WORTH A LOT MORE WHEN YOU NEED IT.

Big Price Reduction

The "UNIVERSAL"

Ratchet Anchor Quick Repair is ON or OFF or ADJUSTED IN A "JIFFY" with the Little Wrench.

"UNIVERSAL" JUNIOR

Is Not a Buckle Anchor, but a Padded "FELLOE GRIP." HOOK the PAIRS OF STRAPS up TIGHT, to meet any variation in tire. THAT'S ALL.

"UNIVERSAL" CLINCHER

Steel Side Plates with TWO or THREE Clincher Hooks. Will Hold ANY BLOW-OUT.

Revised Price List, Effective June 1st, 1913

"RA" TYPE Reinforced & Armored Length of Boot

Tire Size	9-in.	12-in.	15-in.
3 in.	\$2.40	\$2.70	\$3.10
3½ in.	2.50	2.85	3.25
4 in.	2.55	2.90	3.35
4½ in.	2.60	2.95	3.45
5 in.	2.65	3.05	3.50

"JUNIOR" Reinforced & Armored Length of Boot

Tire Size	9-in.	12-in.	15-in.
3 in.	\$1.35	\$1.60	\$1.75
3½ in.	1.45	1.75	2.20
4 in.	1.50	1.80	2.40
4½ in.	1.55	1.80	2.45
5 in.	1.60	2.00	2.60

CLINCHER BOOT Reinforced & Armored Length of Boot

Tire Size	9-in.	12-in.	15-in.
3 in.	\$1.05	\$1.30	\$1.45
3½ in.	1.10	1.50	1.65
4 in.	1.20	1.55	1.75
4½ in.	1.25	1.60	1.85
5 in.	1.30	1.70	1.90

"RA" TYPE Plain Length of Boot

Tire Size	9-in.	12-in.	15-in.
3 in.	\$2.20	\$2.40	\$2.85
3½ in.	2.25	2.50	2.95
4 in.	2.35	2.60	3.10
4½ in.	2.45	2.70	3.20
5 in.	2.50	2.80	3.30

"JUNIOR" Plain Length of Boot

Tire Size	9-in.	12-in.	15-in.
3 in.	\$1.05	\$1.30	\$1.70
3½ in.	1.10	1.35	1.85
4 in.	1.20	1.50	1.90
4½ in.	1.25	1.55	2.10
5 in.	1.35	1.65	2.25

CLINCHER BOOT Plain Length of Boot

Tire Size	9-in.	12-in.	15-in.
3 in.	\$0.70	\$0.95	\$1.10
3½ in.	.80	1.10	1.20
4 in.	.90	1.20	1.30
4½ in.	.95	1.30	1.40
5 in.	1.00	1.35	1.50

Dealers Get Our Discounts!

Ask your dealer: or we will SEND YOU WHAT YOU WANT.
ANYWHERE, PREPAID, on Receipt of Price.

UNIVERSAL TIRE PROTECTOR CO.,

Dept. M.

Angola, Ind.

AN EIGHTH REASON WHY

Practically All the Leading Car Builders are Large Users of



Easy to put on. No drilling or otherwise marring the car. Noiseless at all times. No further adjustment required and will outlast the car.

GABRIEL

Rebound Snubbers

(Standard Equipment on the Easiest Riding Cars)
PEERLESS STEARNS WHITE

They ensure the utmost easy riding on rough roads without interfering in the slightest degree with full resiliency of the springs on smoother roads.

Only in Gabriels can be found the 100%-all-the-time standard of efficiency demanded by car owners.

You will never know the easy-riding possibilities of your car until you use Gabriels. Arrange for a trial. Let us send you name of nearest dealer.

GABRIEL HORN MFG. CO., 1415 E. 40th ST., CLEVELAND, O.

Makers of the famous GABRIEL Musical Horns and Auto Accessories

SPLITDORF

"Always There"

Neglect Breeds Mischief

and every day you neglect insisting upon the use of SPLITDORF COMMON SENSE PLUGS you are opening the way for mischief in your ignition system and your motor.

We make no mistake in claiming absolute superiority for SPLITDORF PLUGS for they are soot-proof, gas-proof and unbreakable and we GUARANTEE OUR CLAIMS.

The insulation of SPLITDORF PLUGS is high quality mica and designed and manufactured to absolutely withstand the breaking down effects of high tension current.

The design of the SPLITDORF central electrode is proof against all expansion and contraction.

The construction of the SPLITDORF shell allows small space for gas and its shape prevents all trouble due to pre-ignition on account of red-hot metal parts.

The SPLITDORF PLUG is less liable to short-circuit from carbon deposits than any other form of plug ever put out by any manufacturer.

Neglect no longer—insist upon SPLITDORF PLUGS with the hexagonal porcelains, and eliminate all chance of future mischief.

Remember, All! "New Ignition for old" is our slogan—we have a SPECIAL EXCHANGE proposition of the greatest interest to every owner of a gasoline motor who would save time and money. Write or call TO-DAY for particulars.



SPLITDORF ELECTRICAL COMPANY

ATLANTA, 8 Harris St.
BOSTON, 180-182 Mass. Ave.
CHICAGO, 64-72 E. 14th St.
DETROIT, 972 Woodward Ave.

KANSAS CITY, 1823 Grand Ave.
LOS ANGELES, 1226 S. Olive St.
NEWARK, 290 Halsey St.
NEW YORK, 18-20 West 63rd St.

PHILADELPHIA, 210-212 N. 13th St.
SAN FRANCISCO, 1023 Geary St.
SEATTLE, 1628 Broadway.
LONDON BUENOS AIRES

FACTORY, NEWARK, N. J.

To Keep a New Car Good Use EAGLEINE NO-KARBON OIL

You are doubtless proud of your car, proud of the powerful, silent, efficient motor which takes you over the highway at any speed, and brings you home again.

But your pride will lose its edge, and your motoring joys will be but a memory when that expensive motor becomes noisy, weakened, and inefficient, because of carbon clogged cylinders.

You can't expect clean cylinders if you lubricate them with impure oil.

Buy EAGLEINE NO-KARBON OIL. It is the purest, safest, and most satisfactory cylinder oil known to the automobile industry.

Eagle Oil & Supply Company

104 Broad St.
BOSTON, MASS.



Chicago Branch: 1114 W. 37th St., Chicago, Ill.

Roger W. Stadlman
21 Hoover St.
Los Angeles, Cal.

THE BROWN IMPULSE TIRE PUMP

HOT WEATHER IS HERE

Are you going to sweat and strain inflating your tires like you always have or are you going to use a Brown Impulse Tire Pump and let your motor do the pumping?

You'll spend \$15.00 for a Brown complete. You'll save this, strength and time enough to pay for it ten times over.

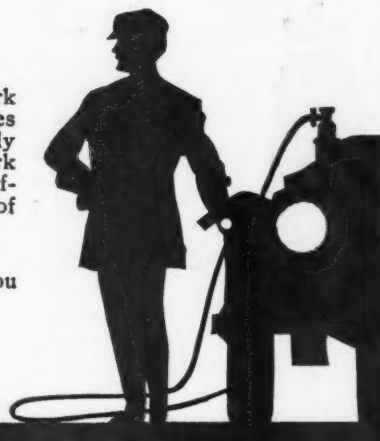
Be Sure It's a Brown Impulse Tire Pump

with a B'Co Quick Detachable Spark Plug. It's the only pump that attaches and detaches without a wrench, the only one that has a Quick Detachable Spark Plug, a Recording Gauge and Self-Opening Valve Connection as part of its regular equipment.

Ask your dealer. If he can't tell you about it, ask us.



The Brown Company, 120 Bellevue, Syracuse, N. Y.



Confidence Born
of Knowledge

Pyrene
TRADE MARK
FIRE
EXTINGUISHER

Brass and Nickel-plated Pyrene Fire Extinguishers are the only one-quart fire extinguishers included in the Lists of Approved Fire Appliances issued by the National Board of Fire Underwriters.



Offices
Atlanta
Baltimore
Boston
Buffalo
Chicago
Dayton
Denver
Louisville
Memphis
Norfolk
Oklahoma City
Pittsburgh
St. Louis
San Antonio
York, Neb.

Used by the Standard Oil Companies, railroads, traction and power companies, and industrial corporations throughout the United States

Will instantly smother the most stubborn gasoline fire.
A gas blanket which completely cuts off the air supply and *smothers* the flame is formed when Pyrene Liquid comes in contact with heat.

Write for booklet
PYRENE MFG. CO. 158 Broadway, New York

LACK OF PYRENE PROTECTION
MAY MAKE YOUR CAR
"A SKELETON ON THE ROAD"

Pacific Coast
Distributors
Gorham
Engineering Co.
San Francisco
Los Angeles
Seattle

Billings & Spencer Tools

"The tools that are guaranteed"



All steel used in forging B & S tools undergoes the most scientific treatment and rigorous tests. For this reason B & S tools are flawless.

(WRITE FOR CATALOG)





The Gould Starting, Lighting and Ignition Battery Does Its Work Right.



Modern starting, lighting and ignition systems impose severe duty upon the storage battery. The almost constant charge or discharge, the high momentary discharge in starting and the constant vibration and jarring of the vehicle in service require that the battery have extreme durability as well as high capacity.

The Gould Batteries made especially for this service are in every way the equal in material and workmanship of those types which have made the enviable reputation of the Gould Storage Battery in driving submarines of the American and foreign navies, in driving New York City street cars, in driving rush hour trains in the Grand Central Station, New York, in lighting the trains of America's leading railroads, etc.

A careful investigation of Gould Batteries will prove convincing as to their genuine merit. Give them a trial,

Gould Storage Battery Co.

GENERAL OFFICES: 30 EAST 42nd ST., NEW YORK

Boston: 89 State Street. Philadelphia: 613 Betz Bldg. Chicago: The Rookery. Detroit: 999 Woodward Ave. Cleveland: American Trust Building. San Francisco: 904 Rialto Building

WORKS: Depew, New York

Agents in: Washington, Kansas City, Denver, Detroit, Topeka, Los Angeles, Seattle, Winnipeg, Montreal and Toronto

Full Stock of Parts, Plates and Repairs Carried by All Offices and Agents



"CASEY" MAKES YOUR OLD TIRES WEAR TWICE AS LONG

K. C. INNER TIRES

Double the life of your tires, stop punctures and blowouts, cut down upkeep and increase your comfort and security.

The cost is very small. The saving of time, trouble and money is very great

The Overlap

feature of Kant Creep Inner Tires gives complete protection to the inner tube at every point. Prevents rim cuts, creeping, pinching. Approved and recommended by tire manufacturers. Get our free booklet "The Tire Question."

Dealers—This is the liveliest wire in the business. Write today for agency

THE WESTERN TIRE & RUBBER CO.
Manufacturers KANSAS CITY, MO.

Starts — Lights — Ignites

REMY

Six Volt System—Does-It-All

WHEN you specify "Remy" as the electrical equipment of your product you eliminate all risk of car depreciation next season.

And the Remy is the only factory in America furnishing the entire electrical equipment for your product—Starting, Lighting and Ignition apparatus in whole or in any combination. Responsibility for the efficient electrical operation of your product is borne by one factory.

Remy Starting and Lighting Equipment is adapted to individual car needs and is sold only to manufacturers. Individual owners of Remy apparatus have the benefit of a National system of service stations.

Write us about our liberal magneto (any make) exchange offer

Remy Electric Company

General Offices and Works, Anderson, Indiana

BRANCHES:
New York Boston Detroit Chicago Kansas City San Francisco Minneapolis
(Service stations throughout the country)

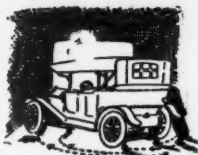


Heavy Cars Are Toys When Mounted Upon **WEAVER** Auto Twin Jacks

HANDLING heavy cars is a simple and easy matter in any public or private garage equipped with Weaver Auto Twin Jacks. The ball-bearing lifting mechanism and ball and roller bearing casters of these jacks enable them to raise and transport the heaviest cars with incredible ease.

The Saving in time and labor in the repair shop, wash room, paint shop or in unloading cars will offset the cost of an equipment of "Weavers" in a few weeks. Then there's the saving in floor space in the storage or sample room by being able to place the cars in closer formation.

ONE MAN AND 2 WEAVER JACKS



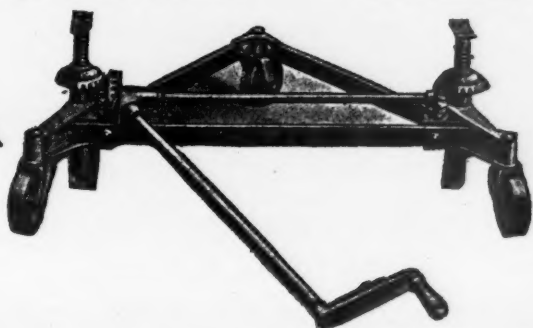
can handle any pleasure car with ease. In the private garage they are as much of a necessity as in the public repair shop. As tire rests they are the most practical and convenient on the market.

Ball and Roller Bearing

The lifting mechanism and casters are ball and roller bearing throughout. Lifting leverage, 400 to 1; wheel base, 34 inches; lifting capacity, 4000 lbs. each; weight, 47 lbs. each.

Two for \$20 One for each axle

Weaver Manufacturing Company
2165-9 South 9th St., Springfield, Ill.



\$1.50
postpaid, or
from your
dealer.

HERZ PLUG

"Bougie Mercedes"

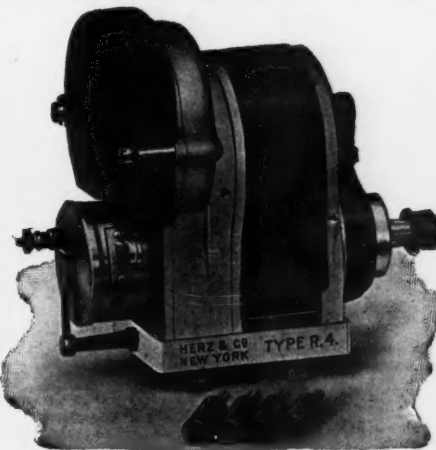
is the result of 20 years of study, experiment and improvement. Its marked superiority over ordinary Plugs is due to the distinctive features of its construction. The insulation is Unbreakable Double Stone (Blue Enameled); there are Four Sparking Points; the electrode of Platinum-Alloy will not burn away; and the Plug is self-cleaning. Every HERZ PLUG is guaranteed a year.

HERZ MAGNETO

was adjudged, in the official English Test against 15 competitors, to be the strongest Magneto of its size and weight by 30 per cent. Its record in use fully justifies this finding.

HERZ MAGNETO produces a hot, efficient spark at very low speed. It is absolutely dustproof and waterproof. The contact points are of Platinum-Iridium.

HERZ & CO., 295 Lafayette St., New York



An initial investment
of \$500.00 puts the

Selden Truck

into service—and it will earn the balance of its cost within the year you have to pay for it.

In offering the Selden One-Ton Truck for \$2000 on the

Time Payment Plan

we give all users an opportunity to prove the value of this efficient delivery method—To satisfy themselves that the Selden is in a class by itself—A thoroughly reliable truck which will do its work economically, day in and day out.

Our confidence in the Selden Truck could be shown in no better way than by the fact that we are ready to back it with the enormous financial resources which this time payment plan necessitates.

Valuable territory may be open for a reliable agent in your vicinity. It will pay you to write today telling us about your sale and service facilities.



Selden Truck Sales Company

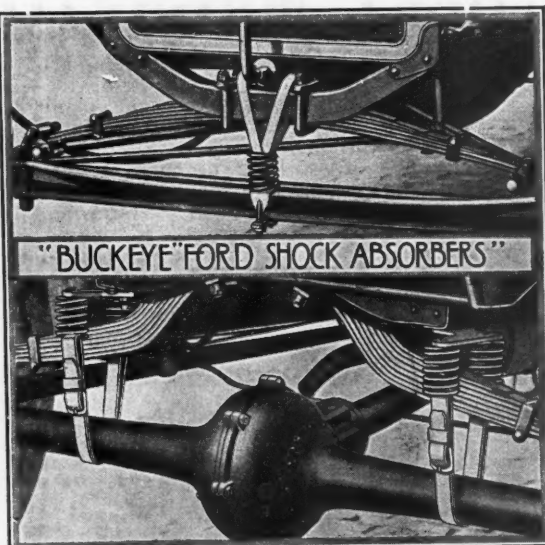
259 East Avenue

Pioneers in Selling Trucks on Time

Rochester, N. Y.

"Ford" Shock Absorbers

FIVE
DOLLARS
THE
SET



1
FOR
FRONT
2
FOR
REAR

Made for "Ford" cars only—fitting any model

Our "Buckeye" Ford Shock Absorbers guarantee Easy Riding on the Roughest of Roads.

Absolutely prevent broken springs, the absorbers taking the shock when springs rise above their neutral position. Front absorber also prevents excessive compression of front spring. Full oil tempered springs of best quality—attached in a few minutes' time—no holes to drill—simply clamp to frame.

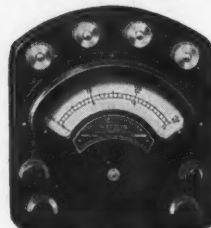
\$5.00 per Set of Three (Shipping weight, 7 pounds)

At all jobbers and dealers, or sent direct on receipt of price.

Manufactured by
THE CENTRAL BRASS & FIXTURE CO., Springfield, Ohio
CANADIAN DISTRIBUTORS
JOHN MILLEN & SON, Montreal, Toronto, Winnipeg, Vancouver

Every Automobile and Garage Owner or Operator

should possess a reliable, durable, convenient Electrical Measuring Instrument



WESTON MODEL 280
Portable Testing Instrument

Weston Miniature Precision Ammeters and Voltmeters

FIT THE POCKET

and are in every way the most accurate, durable, reliable and altogether satisfactory for testing—batteries and electrical circuits.

Send for 30-page bulletin No. 8 describing these and other small instruments.

Weston Electrical Instrument Co.
NEWARK, N. J.

New York	Boston	Denver	Birmingham	Montreal
Philadelphia	San Francisco	Cleveland	Toronto	Paris
Chicago	St. Louis	Detroit	London	Berlin

Have You An Unsatisfactory Magneto?

Even if your motor has no timer shaft you can nevertheless install

The Atwater Kent Ignition System

by means of our "Magneto Gear Mounting." It fits the standard magneto platform and connects to the magneto drive shaft. The gears it contains are enclosed, smooth running and quiet in operation.

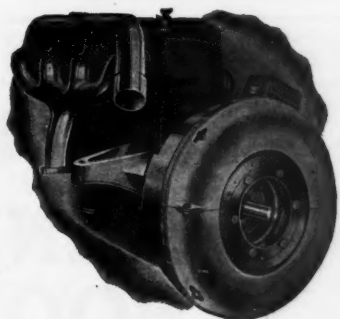


For one-half the price of a new magneto you can replace your old one with an Atwater Kent System which will run your motor as smoothly "on high" at three miles an hour as at thirty or fifty. If you are also interested in increasing the speed, flexibility and hill-climbing ability of your car, you will want a copy of our latest literature describing the Atwater Kent System.

WRITE
FOR
FOLDER "A"

ATWATER KENT MFG. WORKS 4934 Stenton Ave.
PHILADELPHIA

U-S-L



U-S-L

Takes the place of the Fly-wheel

The U-S-L Electric Starter and Lighter is a combination motor and generator that takes the place of the fly-wheel. The armature of the motor-generator is bolted directly to the engine crank-shaft.

The U-S-L doesn't add a single extra moving part to a car.

No gears or chains	No extra clutches
No added weight	Starts at a push of foot-button
No bearings to oil	Supplies ample current

Adopted by
Rambler, Overland, Garford,
Edwards-Knight, Moyer, S. G. V.

Write for Bulletin 501

The U. S. Light & Heating Co.

General Offices: 30 Church St., New York

Branch Offices and Service Stations—New York, Boston, Buffalo, Cleveland, Detroit, Chicago, St. Louis, San Francisco.

INSIST UPON THE RED TAG



ACCEPT NO SUBSTITUTE
FOR
PLATINUM POINTED

Mosler
Spit Fire
Plugs

A. R. MOSLER & CO.
P. O. Box "M," MT. VERNON, N. Y.

510

83.5 Miles on a Single Gallon of Fuel

All mileage records were broken on June 21st, 1913, by a Franklin car equipped with a

Newcomb Carburetor



Send for Booklet 160M
and Reprint

You are doubtless familiar with this test. For full particulars see official report of the Auto Club of America, under whose auspices the test was made. Why not get familiar with the carburetor that meters out and atomizes the scientifically correct amount of fuel for every driving condition?

The Holtzer-Cabot Electric Co.
Chicago, Ill. Brookline, Mass.

Gear Steel

By

The Cross Rolled [United] Process

FREE FROM SEAMS, UNIFORM QUALITY

Cross rolled (United) Steel gives you assurance that the labor and expense you put into your manufacture is not going to be ruined by an inferior or even an ordinary steel.

No matter whether it is Chrome Vanadium, Nickel, Chrome or Special Analysis O.

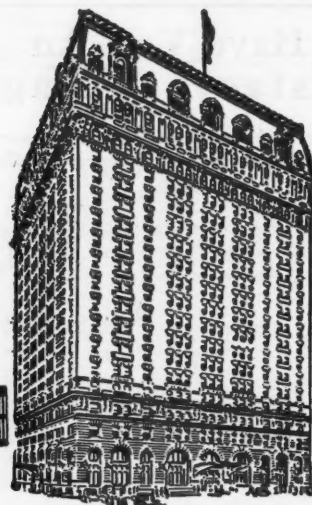
H. Steel, we can offer you the same superiority and exclusiveness.

Write today
for quotation
and data

The United Steel Company

CANTON, OHIO

NEW YORK CHICAGO DETROIT CINCINNATI



Hotel La Salle

CHICAGO'S FINEST HOTEL

ERNEST J. STEVENS, Vice-Pres. and Mgr.

Located in the heart of the city, within easy reach of all railway terminals

RATES

ONE PERSON Room with detached bath.....\$2 to \$3 per day
Room with private bath.....\$3 to \$5 per day
TWO PERSONS Room with detached bath.....\$3 to \$5 per day
Room with private bath.....\$5 to \$8 per day

TWO CONNECTING ROOMS WITH BATH

Two persons\$5 to \$8 per day
Four persons\$8 to \$15 per day
SUITES\$10 to \$35 per day

LA SALLE AT MADISON STREET, CHICAGO

Transmissions

Steering Gears



Differentials

Controls & Clutches

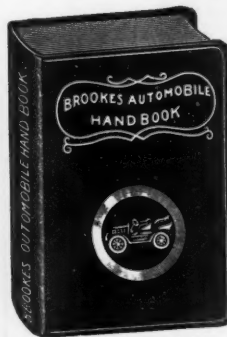
Warner Gear Co.

Muncie Ind.

Branch Office
Detroit 628 Ford Bldg

NEW EDITION

The Automobile HAND BOOK



OVER 100,000 SOLD

By L. ELLIOTT BROOKES

Assisted by Other Well Known Experts

PRICE \$2.00

Revised and Enlarged New Edition—The largest and most practical work published—Used by all up-to-date automobile schools as their every-day textbook. 16mo, over 650 Pages and over 320 Illustrations. Full Leather Limp, Round Corners, Red Edges.

THE Automobile Hand Book is a work of practical information for the use of owners, operators and automobile mechanics, giving full and concise information on all questions relating to the construction, care and operation of gasoline and electric automobiles, including road troubles, motor troubles, carburetor troubles, ignition troubles, battery troubles, clutch troubles, starting troubles. With numerous tables, useful rules and formulas, wiring diagrams and over 320 illustrations.

The Class Journal Co.

910 S. Michigan Ave., Chicago

All will agree that an air-cooled glove is the coolest for summer motoring

And you will agree, after a fair trial, that Grinnell Auto Gloves are the *best* you can buy for many reasons—smoothest fitting, lightest feeling, smartest looking, longest wearing.

No other leather is so soft, flexible, tough and serviceable as the "Reindeer" and coltskin from which these gloves are cut.

Grinnell-Gloves

Sold with a Bond

They are ventilated

on the back by rows of tiny holes, to admit the cooling air but not the dust—keeping the hand at all times cool and dry.

The Grinnell patented "Rist-Fit" improvement (a "V" of soft leather in the cuff, with a simple strap adjustment) makes the glove "fit like a second skin" and keeps the distinctive gauntlet always in place—it can't sag.

Grinnell Gloves give you the most for your money in class, comfort, service. Every style and size for all occasions—motoring, sporting, street and dress wear. See them at your dealer's. If he doesn't carry them

Write for Free Glove Book, samples of leather, and our "Pair on Approval, Prepaid," offer.

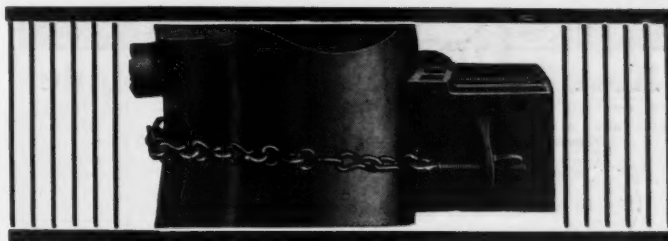
Morrison-Ricker Mfg. Co.

Established 1856

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Style V 4400



Vulcanize Tires Now By S-T-E-A-M!

YOU can now vulcanize the factory way right at home! No more digging into your pockets to pay big repair bills for punctures, blowouts and tire cuts. And no more risk of losing more than you save, by **Burning Your Tire!** In 20 minutes, meanest holes now fixed forever with the

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Saves \$2 to \$6 at a Wallop!

Mends any hole, ragged or clean cut, in tube or casing, up to 2½ inches, on one setting. Reset for larger hole. Does it in 20 minutes. Welds new rubber to old by the *steam process*—the same as used by all the big factories. Only vulcanizer of any kind made. Makes repair integral part of casing and as strong as casing itself. Consider what such *garage* repairs as this would cost! Why, in a single season this *steam* vulcanizer saves its cost over and over again. And using it is simplicity itself.

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Here's a bright and shining light among money-makers! Not a motorist but what needs a *Steam Vulcanizer*. Price astonishingly low. Write for liberal proposition quick. (7)

CONNECTICUT

Shock Absorbers Free Installation Anywhere on Thirty Days' Free Trial

You pay nothing to have Connecticut Shock Absorbers installed on your car. We install them anywhere in the United States without charge. Try them for 30 days. Then if you're not satisfied, they will be taken off. The trial will not have cost you a penny.

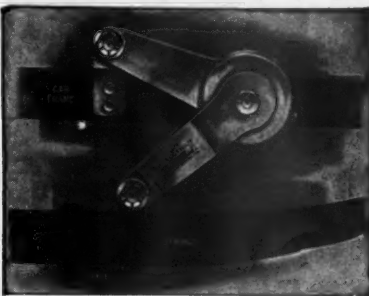
Connecticut Shock Absorbers require no attention after installation. They will fit any car and meet all road and load conditions. They prevent excessive spring action but do not interfere with normal action. They not only increase comfort and decrease expense—but they also reduce the danger from skidding.

Write for Bulletin No. 24

The Connecticut Shock Absorber Co., Inc.

Meriden, Conn.

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Philadelphia, 1414 Race St.
San Francisco, 530 Golden Gate Ave.
Seattle, 924 E. Pike St.
Boston, 224 Pleasant St.
Los Angeles, 1229 So. Olive St.
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That is what a spark plug manufacturer wrote us. He KNEW. He had tried out EMPIRE Porcelains under stresses and strains many times greater than those met with in every-day service. He found that they stood up under the terrific heat and the incessant jarring and hammering of vibrating cylinders with efficiency close to 100%.

Send us your specifications. We'll send you sample porcelains. Try them out in any fair way you will. Prove our claims to your own satisfaction.

Manufactured by expert workmen from specially selected kaolin. Fired at a temperature of 2,600° F. Subjected to brutal efficiency test for breakage and long life.

Write for our Catalogue.

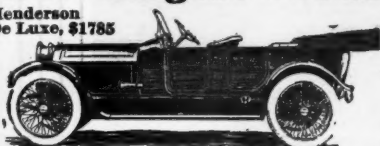
Empire China Works

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BROOKLYN, N. Y.

EMPIRE

How Largest Profits are Made

Henderson
De Luxe, \$1785



We have some interesting facts in connection with increasing your car sales and profits.

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Through merchandizing strategy we have remedied these flaws. May we tell you about these things and about our kerosene-burning car, equipped with wire wheels, cowl dash, cowl gasoline tank. Left drive, center seat control—the most salable car offered today.

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Henderson Motor Car Co.
Indianapolis, Indiana

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Model Gas Engine Works

PERU, INDIANA

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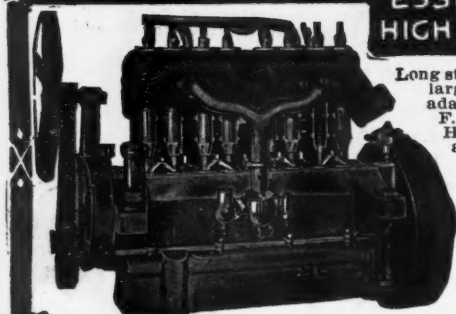


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Kissel Motor Car Co.
121 Kissel Ave.
HARTFORD, WIS.

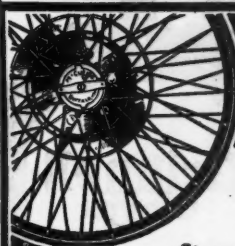
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Long stroke, large bearings, large valves, 4 1/2 x 5, adapted for Regal, E. M. F., Warren, Autocar, Hudson and all standard makes of cars and trucks. We also furnish transmission gears. Two and four cylinder sizes, from 20 to 60 H.P.

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Add a Big Percentage of Tire Mileage

Strong, Resilient, Indestructible

These wheels are equipped with **S** Standard Spokes, made by the Standard Company of Torrington, Conn.

THE M'CUE COMPANY
Buffalo New York

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New Catalog Just Issued

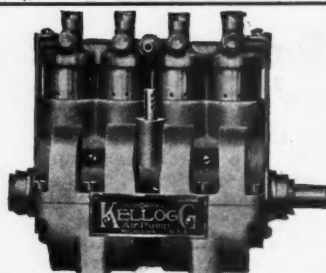
Write today for copy of 64-page, library size book, completely describing the 1914 Winton Six, the fashion plate of automobiles. Also contains valuable and unusual information for everybody who plans to buy any car.

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World's First Maker of Sixes Exclusively.

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in that it delivers a steady flow of air, and will inflate a tire in half the time of other pumps, with much less work on the motor.

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Carry more balls and larger balls, size for size, than any other bearing with uninterrupted race shoulders. This means that, size for size, Norma Ball Bearings are stronger, have a greater margin of safety, a greater wearing power, than any other ball bearings. The explanation lies in the design of the Norma Ball Cage, which holds the balls without any possibility of contact between ball and ball.

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\$2.00 to \$5.00**

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Don't put up with bad smelling, dirty, rattling oil lamps. You can have a neat, efficient electric lighting system at moderate cost by equipping your car with

J-M MOBILITE LAMPS

"The Electric Lamp That Operates on Dry Batteries"

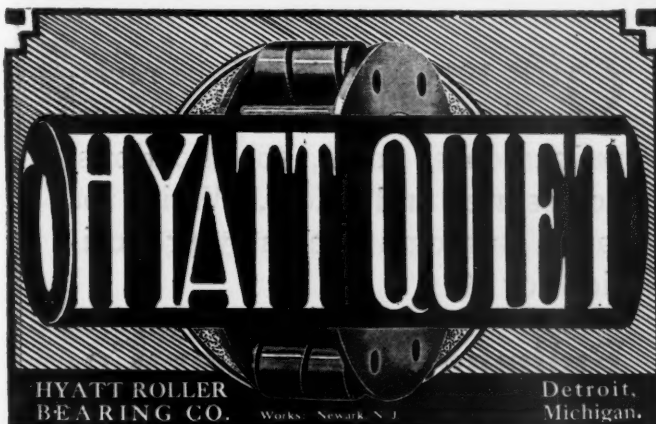
These lamps consist of a vulcanized rubber socket fitted with a special Tungsten bulb. The light is intensified by a powerful lens and reflector. Used for dash lights, tail lights, speedometer lights and interior car illumination. Also for motor boats, camps, etc. They cost only one-third as much to operate as standard electric equipment. Operate on dry batteries. Storage battery, magneto or low power dynamo may be used if desired. Any handy man can install them. Price \$3.00 each, including necessary wire. Order from our nearest branch if not at your dealer's.

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United States Tires
are good tires

They cut down tire bills

SHELDON
AXLES & SPRINGS
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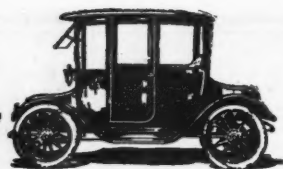
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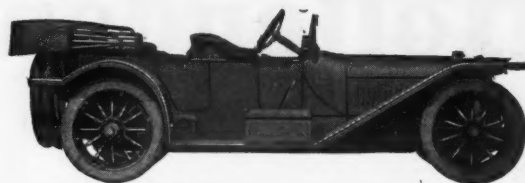
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has four times the wearing service of the ordinary non-skid. Users will tell you that they have run Swinehart Keaton Non-Skid Tread Tires a whole season without having them lose their anti-skid effectiveness. Call at any one of our stores and investigate them. We also make a complete line of Smooth Pneumatic Tires of best quality. Branches and distributing agencies in all leading cities.

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In five years not one Cleveland - Canton Chrome - Vanadium spring returned because of breakage or settling.

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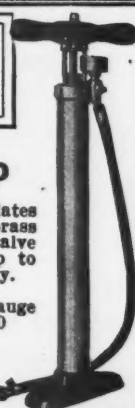
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50¢



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The most economical and enjoyable outing in America

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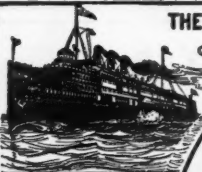

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THE RUTENBER MOTOR

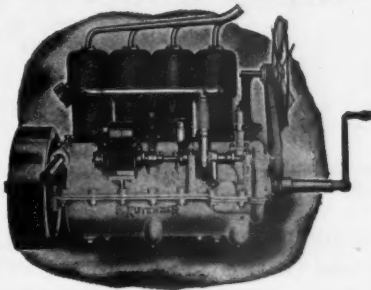
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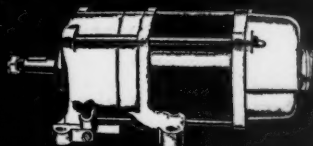
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New Six Passenger, Coupe and Limousine
Bodies slightly higher.

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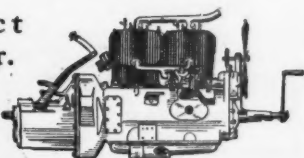
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We never over contract
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Makes possible the use of airless tires without sacri-
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Makes any car ride like a cradle.

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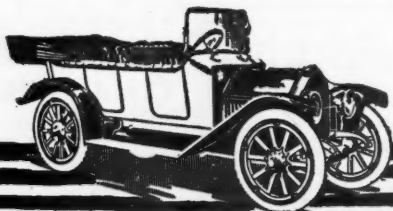
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THE GEARLESS CAR



"No clutch to slip—no gears to strip."

\$475

1914 Improvements

Completely Equipped

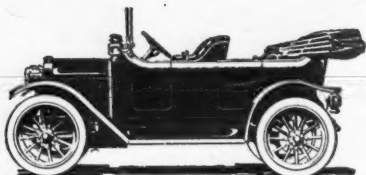
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25 H. P. Long Stroke Motor

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It is instantly responsive and eliminates constant care and adjustment.

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Size 11½x15½ printed in colors. Sent free to any dealer who writes on his own stationery.

Our Dealers' is waiting for you. Tells how to sell more lamps and pile up profits. Write today for hanger and dealers' proposition

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Guide MOTOR LAMPS

ZENITH

Gives Standard Carburetion

ZENITH CARBURETOR CO.
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PENNSYLVANIA Oilproof VACUUM CUP TIRES

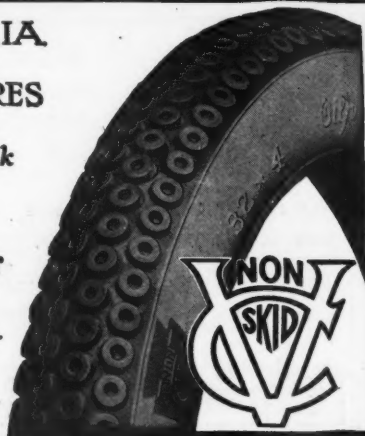
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You want absolute accuracy in speed readings just as you want the right time from your watch. There is one way to get it—get a New Jones.

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The Republic **STAGGARD**
Tread non-skid is in a class by
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it does. It may cost a little
more at the start, but it gives
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The Spark Plug that is water-proof,
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**THE ONLY GENUINE
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All standard sizes...\$1.00

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"THE CAR OF UNFAILING SERVICE"

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Completely
Equipped

DREADNOUGHT MOLINE M-40

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OPERATES FROM MAGNETO—NO BATTERIES NEEDED



Why "HI-LO" is horn perfection.
No vibrator contacts to adjust.
No pivots or bearings to wear.
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No sticking of reed.
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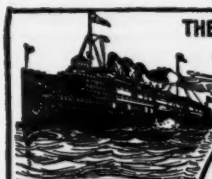
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Anyone Can Attach It in 15 Minutes

GUARANTEED

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The most economical and enjoyable outing in America
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It will show and tell you more about
recent developments in motor car
accessories than you think can be
compressed within the pages of a
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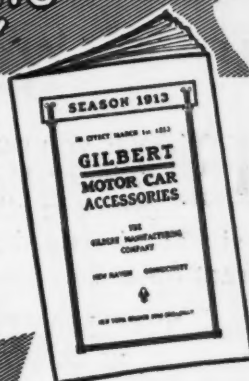
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The Name "MOON"
has become synonymous
with honest construction
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With Electric Self-Starter. An Electric Starter of proved efficiency is one of the features of the Ames "45"—a car with every essential refinement contributing to comfort, yet priced at \$1,785. Without Starter, electric lighted \$1,635. Made with well-known "Amesbilt" body. 5-passenger, motor-driven electric lights. Perfect cooling system. Force-feed pump. Schebler Carburetor, new Remy dual system high tension magneto, oil-driven pumps. Sight-feed. Warner multiple disc, Raybestos-lined clutch. Selective transmission, 3 speeds forward and reverse. Stewart speedometer. Best mohair top, side curtains, boot. 364-inch Tires.

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STEEL USE THEM FOREVER

SKID BLOWOUTS RIMCUTS PUNCTURES WEARING OFF OF RUBBER NIT

Each section 2 in. wide. They hook to rims. Try two or three sections over any old blowout.

Special Prices to the First in New Territory

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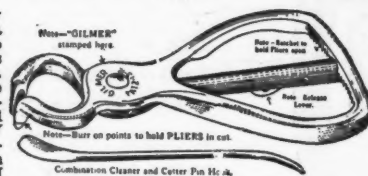

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Beaver "Sixes" offer the following 1914 features: long stroke (3 1/4 x 5); just right power, 45 H. P.; 3-point suspension; large valves with enclosed action; enclosed fly wheel; 3-speed transmission; noiseless, vibrationless, oil and dust tight action; arrangement for installation of any make Electric Starting and Lighting System. Write for catalog and prices.

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More power - Less fuel - Wider range

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Electric Self-cranking, Electrically Lighted
 Four Forward Speeds

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 Model 30 Touring Car...\$1350 Model 30 Roadster...\$1250

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"SIX-48" \$3250 Fully Equipped

Riverside Touring Car

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THE MASTER CAR **FIAT** 16th YEAR

6 Cyl. 50 H. P. \$5000
4 Cyl. 55 H. P. \$4500
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NEW YORK

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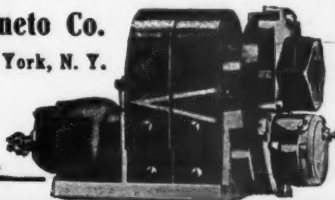
Automatic Spark Control

Quality—not only as to efficiency and manufacture, but in design as well—characterizes all Eisemann Ignition systems. Not only do they insure hot fat sparks at all speeds—but they are simple, accessible and fool proof.

The Eisemann Magneto Co.

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Emergency Spring Repairer

(Manufactured Under a Basic Patent)



Price, \$3.50

Repairer attached to spring broken in center at spring bolt—a common occurrence. Taken in time by attaching Spring Repairer there need be no cause for alarm. May be placed in other positions wherever springs are broken.

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Sole Manufacturers

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SAFETY TREAD

(Squeegee) TIRES

Won't Slip - Won't Slide

Won't Skid - They Grip!

THE DIAMOND RUBBER CO. OF N. Y.
Subsidiary of The B. F. Goodrich Co.
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A LOZIER FOR \$3,250!

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A completely equipped Light Six which will meet the big demand for a really high-class car of this type. Dealers from coast to coast who have investigated the LOZIER "Self-Seller" say it is the greatest motor car value they have ever seen.

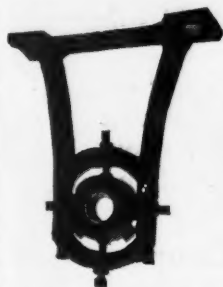
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LOZIER MOTOR CO., DETROIT

SUSPENSION BALL BEARINGS

Two Rows of Balls and All Balls Loaded All the Time



Now used in various kinds of machinery,

Motor Cars

and other vehicles and for the equipment of our Special Double Row Ball Bearing Shaft Hangers.

We also make Plain and Grooved Thrust Bearings.

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Model 45, \$2750

6 Cylinder, Left-hand Drive
Center Control
132-inch Wheel Base.

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MUNCIE, INDIANA

THE WOODSTOCK The Hotel of Comfort

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Our new addition is ready for occupancy. We now have 360 rooms with 265 baths. Write us for descriptive folder with typical floor plan and rate card. Wire for reservation at our expense.

Rates
From \$2.50 to \$4.00 Per Day

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You Can Walk From There to Anywhere.

The 6-Cylinder, Reasonably Priced

de Soto 55 H.P.

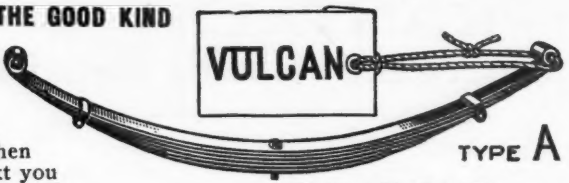
The car with a stronger appeal than any recent product of the trade—the one that meets a popular demand. We have an unusually attractive proposition for dealers. Write at once for free catalog and full particulars.

Sells for
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THE GOOD KIND



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Stock on Hand to Fit:

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Buick	Flanders	Oakland
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Garage Compressors

A high-class car equipment deserves high-class garage equipment. The quality of these little compressors is such as to appeal to the most discriminating buyers.

Booklet 608



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"Rides Like a Pullman—Pulls Like a Locomotive"

38 Years' Manufacturing Experience
Built Into Every Model

Model 33M—Two Passenger Roadster; 33 H. P. long stroke motor $3\frac{1}{2} \times 5\frac{1}{4}$ —Price, \$1150.

Model 33L—Five Passenger Touring Car; 33 H. P. long stroke motor $3\frac{1}{2} \times 5\frac{1}{4}$ —Price, \$1150.

Model 40A—Two Passenger Roadster; 40 H. P. long stroke motor $4\frac{1}{2} \times 5$ —Price, \$1650.

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KINWOOD RADIATORS, FENDERS
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SPECIAL METAL STAMPINGS

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Take no chances on Slippery Pavements and muddy roads.

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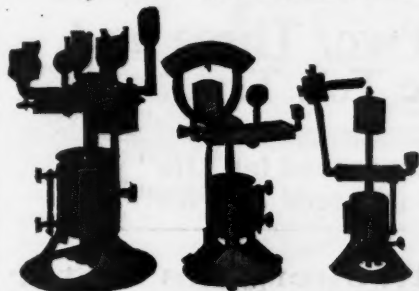

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Plants from
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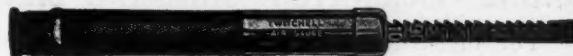
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You can take a thousand miles of service out of a set of tires by driving them insufficiently inflated over ten miles of road.

Use the New Positive Lock Stop

TWITCHELL AIR GAUGE

and save your tires



"TIRE INSURANCE FOR \$1.00"

Simple, Accurate, Durable and Easily Read

For sale by Jobbers, Dealers, Garages, or

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STAR BALL RETAINERS are famous wherever ball bearings are known. The best bearing service attends the car equipped with STAR BALL RETAINERS. We also manufacture more thrust bearings than any concern on the market. Send us your requirements.

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How much does a battery cost? How long are batteries lasting? How much do other repairs and replacements cost?

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If any editor, or any advertiser, claims that electric lights cost less to use than Prest-O-Lite, you can easily prove that he is either ignorant or worse.

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There is never any difficulty about warning with a

NEWTONE MOTOR HORN

Its tone while compelling is courteous

Price \$20



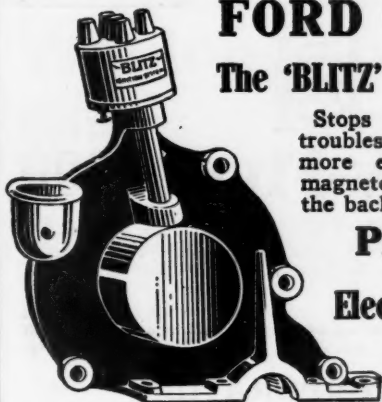
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Automobile Supply
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The 'BLITZ' Ignition System



Stops all of your ignition troubles. Makes your car more efficient. Uses Ford magneto current. Eliminates the back kick.

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Backed by 15 years of specialization. Found on more high-grade cars than all other makes of lamps.

A Solar Lamp for every motor need.

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PATENTED IN U.S.A. AND ALL FOREIGN COUNTRIES
STOCK SHEETS 6" WIDE BY 36" LONG

LINDHE "LAMINATED" SHIMMING BRASS

with Laminations of .002" or of .003"

For Adjustments of Bearings. No More Filing.

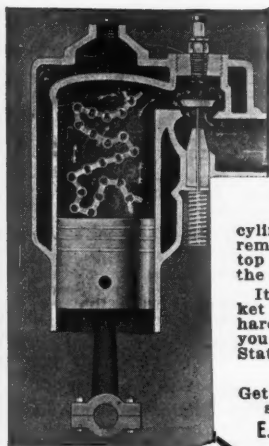
A perfect reduction is obtained at once simply by loosening one corner of a layer with a knife or other sharp instrument and peeling it off. The rest of the shim remains as solid as ever.

Stock Sheets and Box Assortments of Strips—On sale

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Special stamped shapes supplied to manufacturers when desired.

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Over 3000

Jobbers and Dealers in the United States Now Recommend and Sell the Michener Chain Carbon Remover.

Being a flexible chain, made of a light gauge wire, a special composition, 90% copper, it cannot scratch or score a cylinder. I positively guarantee that it will remove all the carbon from the piston head, top and sides of cylinders without injury to the motor.

It is the only carbon remover on the market today that will absolutely remove the hard scales of carbon. Get two chains and you can clean two cylinders at same time. State kind of motor when ordering.

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Get them from your dealer, or if he cannot supply you, I will send direct postpaid.

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One, Two, Three and
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"Guaranteed for Life"

"Guaranteed Service"

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	Five passenger.	
Majestic	"four"	\$1975
	Five passenger.	
Sultanic	"six"	\$2650
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Sultanic	"six"	\$2500
	Five passenger.	

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Write for catalog.

The Ames Shock Absorber

is making good because IT—

Does the work
Prevents broken springs
Nothing to get out of order

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AUTOMATIC
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Infallible Starting

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1913 FULLY EQUIPPED \$1585

LUXURY — POWER
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Long Stroke Motor, Big Roomy English Body,
Center Control, Left Hand Drive, Every Nec-
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Complete Equipment

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SIX \$2000
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Simplicity, Strength, Durability—



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You would not think of putting an inferior motor in your car, would you? Superior transmissions are essential as the best motors.

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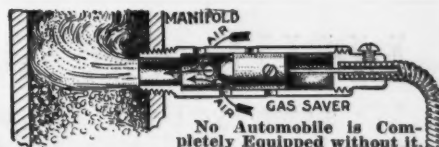
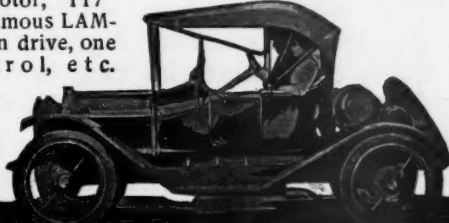
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The LAMBERT Model 99 (5-passenger touring car or 2-passenger roadster) at \$1365 (fully equipped) stands it comprises $4\frac{1}{2} \times 5\frac{1}{4}$

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Saves up to 40% INCREASES POWER SAVES YOUR BRAKES 20% Guaranteed INCREASES SPEED

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WORTHY OF THE NAME

THE PATHFINDER car is an unusual combination of mechanical virtues. Each detail is standard in design, workmanship, and quality materials.

The Pathfinder chassis is a composite of the best proven ideas in European and American practice—built to withstand rough usage and to remain quiet even in "old age." The Pathfinder "selling plan" is one you will be glad to know about. It is unique and comes to you in the form of the "101 Reasons," a short, concise course in Pathfinder salesmanship. Yes, it is absolutely different—better write today, NOW!

Just ask for—
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Economy is too big a matter to be found lurking in cheap prices.



TRADE MARK
NON-FLUID OIL
REGISTERED
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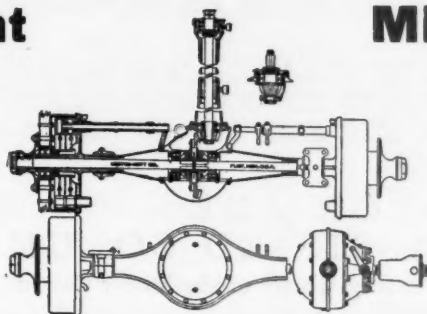
Costs more than other lubricants for bearings and gears but its use reveals true Economy in dollars saved on repairs and in Efficiency retained in your car.

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HESS Axles have been on the market but 2 years. Fourteen car manufacturers in that short time exclusively adopted them as regular equipment.

Renewals of HESS contracts for 1913 from past users and an increasing HESS demand among new manufacturers, is ample proof of the stability of HESS Quality.

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We Specialize in High-grade Automobile Parts

**Transmissions
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"Ideal" Washer with sponge attached.

Our "Ideal" Carriage Washers and Automatic Water Savers save the water.

Ask Us About Them

C. T. HAM MFG. COMPANY
Rochester, N. Y.

GOOD YEAR

AKRON, OHIO

This name on Automobile Tires and Rubber Accessories signifies inherent qualities of material and workmanship that insure the maximum of service at the minimum of expense. (673)

THE GOODYEAR TIRE & RUBBER CO.
AKRON, OHIO

Patented

Manufacturers of 1913 Models Don't omit a SPARKS-WITHINGTON Fan from your 1913 specifications. Our One-Piece blade, ball-bearing, radiator fan assemblies cool the motors of more high-class cars than any other fan on the market. There's a reason. SPARKS-WITHINGTON Fans deliver the greatest volume of air with the least H. P. consumption of any fan obtainable. Furthermore, their one-piece construction is positive insurance against blades which loosen, become detached and fly off. Undoubtedly one of our ten standard models is just what you have been looking for. Catalogue and detailed blue-prints on request. Get in touch with us.

The Sparks-Withington Co.
JACKSON MICHIGAN - WALKERVILLE CAN.

The Pilot "THE CAR AHEAD"

Three Great Models: Pilot 40—Four cylinders, 4½x5; brake test, 53 horse-power; 120" wheel base; price, \$2000. Pilot 50—Four cylinders, 4½x6; brake test, 59 horse-power; 126" wheel base; price, \$2250. Pilot 60—Six cylinder, 4x6; brake test, 67 horse-power; 132" wheel base; price, \$2500.

The Car Without a Mechanical Defect

Teetor "T" head motors, full floating rear axles, Brown-Lipe differential, Warner transmission, Eisemann magneto, Stromberg carburetor, handsome jewel bodies with ventilating windshield. Completely equipped, with every convenience and comfort. Dynamo electric lighting and electric starter (Gray & Davis system), power tire pump. We have the greatest agency proposition in the United States.

Write for our beautiful art book, showing cars in detail

PILOT CAR SALES COMPANY

Richmond, Indiana

Reo the Fifth

Final and crowning achievement of R. E. Olds, pioneer designer of autos. A standard size 30 to 35 horsepower four-cylinder car of modern refinements priced at only \$1095.

R. M. OWEN & CO., General Sales Agents
REO MOTOR CAR CO., LANSING, MICH.

A Shot in the Dark

Seldom Hits Anyone But the Wrong Fellow

The same axiom applies to advertising. An advertisement in "just any paper" may catch the attention of desired parties—but it is another case of shooting in the dark and hoping to hit the mark. If you really want the attention of motor car owners, dealers or manufacturers—if you want to shoot in broad daylight, with short range and a hair trigger, use

MOTOR AGE
CLASSIFIED COLUMNS
The Trading Center of the Motor Car Industry

The Buyers Guide

A Directory for the Guidance of Motor Age Readers

All Kinds of AUTOMOBILE SPRINGS



Cut shows **TITANIC SPRINGS**, which have no breakage. No hole to break at. Absolutely guaranteed. If broken at center will replace and no questions asked. For any car. Take your choice. We make every pattern.

TUTHILL SPRING CO., 762 Polk St., Chicago

THE LITTLE STEERSMAN



**MODERN
AUTO APPLIANCE CO.**
Chatham, N. Y.

A helical spring made of oil tempered steel wire, attached as illustrated, makes any car easier to control and helps prevent accidents. You should have one. Ask your dealer or write for full information.

Automobile, Motorcycle and Bicycle Supplies

Ask for catalog "M"
Dealers only

THE BECKLEY-RALSTON CO.
Mich. Ave. & Randolph St., Chicago

FORD DEALERS

Have you received our 1913 Ford supplement? Full line of new goods for Ford cars. Also other new goods.

Prompt shipments—our policy

Chicago Automobile Supply House
1855 So. Michigan Blvd., Chicago, Illinois



"A Giant in Power
—A Miser in Fuel"

25% to 50% more mileage

Write for illustrated descriptive booklet.

Schoen Jackson Company, Media, Pa.

— Buy BETTER Springs —

Guaranteed against breakage and sagging at less price than of car factories.

Freight allowed on 4 or more.

In stock, painted for Ford, Buick, Cadillac, Chalmers, Hudson, Maxwell, Regal, Reo, and others. Send for complete list and price.

NEW ERA SPRING & SPECIALTY COMPANY
247 Jefferson Ave., Detroit



AUTOMOBILE TOPS

Write for catalogue and prices.
We can save you money.
BUOB & SCHEU, Court & B'way, Cincinnati, O.

NEW CATALOG 300 PAGES Now Ready

**MOTOR CAR
MOTOR CYCLE
MACHINISTS' BICYCLE**
**SUPPLIES
AND BICYCLES**

WHOLESALE ONLY DEALERS, GET YOUR NAME IN

MOTOR CAR SUPPLY COMPANY
1451-1453-1455 Michigan Ave., Chicago

ESTABLISHED 1914

SCHRADER

UNIVERSAL VALVES

TRADE MARK REGISTERED APRIL 30, 1915

The Standard American Valves for Automobile, Bicycle & Vehicle Tires

Manufactured by
A. SCHRADER'S SONS, INC.
28-32 Rose Street New York, U. S. A.

A shot in the dark seldom hits anyone but the wrong fellow

The same axiom applies to advertising. An advertisement in "just any paper" may catch the attention of desired parties—but it is another case of shooting in the dark and hoping to hit the mark. If you really want the attention of motor car owners, dealers or manufacturers—if you want to shoot in broad daylight, with short range and a hair trigger, use

MOTOR AGE Classified Columns

*The Trading Center of
the Motor Car Industry*

Motor Age is read once a week by more people who own, sell, handle or manufacture motor cars and accessories than any other publication in the country.

Motor Age carries more Classified Advertising week in and week out than any other motor car publication. The cost is small, the chances for returns unexcelled.

An advertisement in **MOTOR AGE** is 100 per cent efficient.

NATIONAL POWER PUMPS

"MADE TO WEAR AND PUMP FRESH AIR"

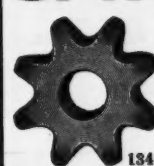
The only spark plug pump which does not fill your tires with gas. Compare and test it with any other pump on the market and we will get your order. Write for complete description today.

Made by

THE NATIONAL MOTOR SUPPLY CO.
1919 EUCLID AVE., CLEVELAND, OHIO

R.I.V. BALL BEARINGS

SPROCKETS



Chains and
Differential

In Stock or Order
Send for New Catalog
CULLMAN WHEEL CO.
1341 Greenwood Terrace, Chicago

Polarine

FRICTION REDUCING MOTOR OIL

Maintains the correct lubricating body at any motor speed or heat.

STANDARD OIL COMPANY
(An Indiana Corporation)

Hoyt Electrical Instrument Works Penacook, N. H.

AUTO-TOP FABRICS OF EVERY DESCRIPTION

SAMPLES AND PRICES ON REQUEST

L. J. MUTTY CO., Boston

WILLIAMS' VENTILATING WINDSHIELD

20th Century Motor Car Supply Co.
South Bend, Ind.

CLASSIFIED ADVERTISEMENTS

*The Trading Center
of the
Motor Car Industry*

MOTOR AGE

Rates—25¢ per line
Minimum Charge \$1.00
6 words to a line

Cars For Sale

AUTOMOBILES AND PARTS; LARGEST
stock ever known.
Progress Brokerage Co.,
527 Grant St., Buffalo, N. Y.

FOR SALE CHEAP

One Twelve-passenger, sight-seeing car, Pullman body, in A-1 condition. Inquire of D. F. Poyer Company, Menominee, Mich.

FOR SALE—COLE 40, 1912; FULLY
equipped, including seat covers, extra tire; perfect condition; will sacrifice. Address Box D 462, c/o Motor Age.

FOR SALE—MATHESON SILENT SIX 50
H. P. five-passenger touring car, Model B, four-door. Has run only five thousand miles and is in fine condition. Paint in good condition and tires (all 36x4½) nearly new. Top and seat covers good. A bargain for anyone wanting a fast and powerful car. Price \$1,000. L. B., No. 510 Fullerton Building, St. Louis.

FOR SALE—MODEL O-O WHITE
Steamer in first-class shape, like new. T. M. Smith, 1969 Montrose Blvd., Chicago, Ill.

FOR SALE—ONE 1913, SEVEN-PASSENGER
Big Six Lozier, used as demonstrator, run less than 5,000 miles; factory overhauled and repainted; looks as good as new; two spare tires, four spare rims; for \$4,000. Louisville Lozier Company, 405 West Broadway, Louisville, Ky.

FOR SALE—SIX CYLINDER "LEXINGTON"
in first-class condition; run 2,000 miles, almost new. Will be sold right to quick buyer. R. J. Allen, Glenwood, Iowa.

FOR SALE—1910 7-PAS. 50-H. P. KISSEL-
kar. Has 5 good casings. Factory overhauled; \$600.00 takes the car. Must be seen to be appreciated. Stewart Garage, Delavan, Wis.

FOR SALE—10 "ATLAS" TAXICABS IN
running condition at \$300 each. Splendid opportunity for some one wishing to start in this money-making business, requiring but a small investment. Dan Condon, 2635 Wash Ave., Chicago.

G. J. G. — SPECIAL RACING MACHINE
capable of doing better than 70 miles per hour mounted on English style of wire wheels with Bosch racing magneto and motor modeled so as to have the minimum of friction to the maximum of speed. Equipped with New any make selected of standard tire equipment. Write for Photograph and specifications to G. J. G. Motor Car Company, White Plains, N. Y.

KNOX 5 PASSENGER MODEL "R" 1910
touring car. 5 new casings, car equal to new, run 7,000 miles. For quick sale will take \$1275.00. Yeggy-Don Sales Co., Rock Island, Ill.

MITCHELLS, REBUILT, GUARANTEED.
These cars are fully equipped. Call or write for further particulars.
Mitchell Automobile Co.,
2334-36-38 Michigan Ave., Chicago.

REO TOURING CAR, 1909, \$200.00. NEED
the money. H. Carlin, Winona, Minn.

SOME REAL BARGAINS FOR YOU.

One Lambert 30-h. p. roadster.....\$250.00
One Studebaker electric..... 350.00
One Brush runabout..... 90.00
And others at proportionate prices; write for list.
American Auto Sales Co., Oshkosh, Wis.

THOMAS FLYER RUNABOUT 4-60—IN
excellent condition. Must sell to settle estate. Will sacrifice if taken immediately.
E. R. M., 11 No. Harrison St.,
East Orange, N. J.

THOMAS FLYER RUNABOUT 4-60—WILL
sacrifice for cash. Buying touring car.
H. C. Levin,
2160 Broadway, New York.

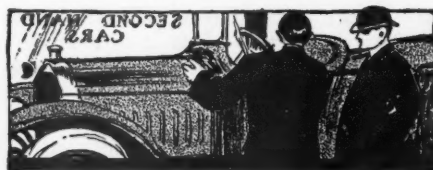
WILL SACRIFICE ONE CRAWFORD, TWO
Mercers, two Darracq Taxicabs.
Trenton Taxicab Company,
Trenton, N. J.

1913 LOZIER SEVEN-PASSENGER BIG
Six with self starter and full equipment. Car is practically brand new and has new tires all around. Price \$3,600.00.
ARCHAMBAULT MOTOR SALES CO.,
197 Ogden Ave., Milwaukee, Wis.

1913 SIX CYLINDER STODDARD KNIGHT
in first-class condition, used but very little. Completely equipped. Wire wheels. Will sell at a reasonable price. Address E. W. K'Burg, 1412 Madison Ave., Toledo, O.

Parts and Accessories FOR SALE

A BARGAIN; STORAGE BATTERIES, 6-80
and 6-160; guaranteed; all makes, new and used, \$3.50 to \$10 for short time only. 4105-7 Cottage Grove Ave., Chicago.



A Good Reason

"We do not care to repeat the advertisement in reference to the Knight car at this time. We sold it through the MOTOR AGE advertisement. That's why."
H. H. W.

A FEW FORD SPECIALTIES

	Reg. Price	Our Price
Oil Gauges	\$1.00	\$0.35
Anti Rattling Ball Sockets.....	2.50	1.25
Electric Lighting Outfits		
8-in. or 9-in.....	9.00	3.50

Write for big summer catalogue, just out.
Globe Auto Specialty Co., Dept. F., 1775 Broadway, New York.

ATTENTION—HENRY OWNERS

Having purchased the repair business of the Henry Motor Co., we are prepared to fill orders promptly for repairs for Henry cars.
Muskegon Automobile Co.,
Muskegon, Mich.

AUTOMATIC SPEEDER AND PRIMER.
Every car owner should have one, saves 25% on gasoline, starts motor with first turn of crank. The most rapid selling automobile device on the market. Agents wanted. Price, \$7.50 f. o. b. Frankfort. Automatic Device Co., 551 E. Jefferson St., Frankfort, Ind.

BALL & ROLLER BEARINGS,

All Types and Sizes.
We also repair or exchange all makes of ball bearings.
THE GWILLIAM CO., 253 W. 58th St., N. Y.
1314 Arch St., Philadelphia.

A WHITE STEAMER GENERATOR AND
burner, almost new. Will sell cheap. Address Box D 245, c/o Motor Age.

AUTO OWNERS IN SMALL TOWNS.

You can save one-half your tire expense and nearly all your tire trouble by using Security Reliners. Many of our customers run their cars the entire season without blowout or puncture and without spending a cent for tire repairs.

YOU CAN DO IT YOURSELF.

If we have no dealer in your town you can get a trial order at the dealer's price, and make a good profit selling to your neighbors. If you run your own car write at once for our plan.

SECURITY RELINER CO.

301 Spring St., Montgomery, N. Y.
248 W. 54th St., New York.

BARGAINS IN SPARK PLUGS, SCHEBLER
carburetors, metal polish, etc. Get illustrated bulletin. Automobile Appliance Co., 1712 S. Michigan Ave., Chicago, Ill.

BERGDOLL REPAIR PARTS.

The repair business of the Bergdoll cars, together with all drawings, jigs, patterns, etc., has been purchased by us. We have a complete stock of repair parts for all models on hand and orders for parts for Bergdoll cars should be placed with us direct to save time.

Louis J. Bergdoll Motor Co.,
124 N. 3rd St., Philadelphia, Pa.

CELLULOSIA—BEST SUBSTITUTE FOR
glass used in automobile and buggy storm fronts, side curtains, etc. Sheet 20x36 in., 85 cents; 12x20 in., 35 cents, postpaid. Hawes Storm Front Co., Coldwater, Mich.

COMPLETE "VULCAN" OXY-ACETYLENE
welding plants from "Vulcan" No. 1 with two oxygen drums (sold, not rented), non-backfiring torch, about ½ weight of average one, practical for garage or blacksmith shop at \$175.00. Larger plants have most simple acetylene generator made; no springs or clock work, but automatically makes gas as fast as it is used. Write us today for booklet on welding.

VULCAN PROCESS CO.,
25th & University Ave., S. E.,
Minneapolis, Minn.

CUT-OUTS

E.M.F., Flanders, Bulck, Regal, etc. Complete outfit with brass lock, open pedal, \$1.50. Lincoln Machine Shop, Lincoln, Ill.

DRAGON REPAIR PARTS.

We manufacture and keep on hand all repair parts for the Dragon cars. We make a specialty of repairing this machine. Philadelphia Machine Works, 67 Laurel St., Philadelphia, Pa.

ELECTRIC HORNS, \$2.90; BUMPERS,
\$3.00. Write for our bargain sheet. Fred Allen Automobile Supply Co., 1610 S. Michigan Ave., Chicago, Ill.

FORD FAN BELTS, WOVEN COTTON AND
silk; outlasts six regular belts. Postpaid, 60c. Dealers, write. Angler's, Streator, Ill.

FORD LIGHTING OUTFITS \$5.50.

Includes parabolic reflectors, tungsten bulbs, wiring switch and free delivery. Truscott Auto Supply Co., St. Joseph, Mich.

FORD OWNERS AND DEALERS!

You will save trouble and money by installing our timer elevating device.
Ford Parts Specialty Co.,
1211 Main St., Richmond, Ind.

FORD OWNERS—OUR SPARE DEMOUNT-
able wheel cures tire trouble on road. Doctors, attention. Write Angler's, Streator, Ill.

FORD OWNERS—WE CAN MAKE YOUR car the easiest rider made with light or heavy load; no jolts, no jars, no upthrow. Write us. Thomas Auxiliary Spring Co., Canisteo, N. Y.

FORD OWNERS: THE BLACKBURN Autolock Switch offers you Certain-Teed Theft Insurance. Yale key for plug. Price \$5.00. Money-Back Guarantee. At your dealer or Blackburn Specialty Co., 1134 Prospect Ave., Cleveland, Ohio.

FORD, HUPP AND MAXWELL Muffler cut-out, machined ready to attach, including lock, open pedal string and cables, \$1.35. Lincoln Machine Shop, Lincoln, Ill. c

FORD T. OWNERS Foot throttle or accelerators, \$1.50. Lincoln Machine Shop, Lincoln, Ill.

FOR SALE.
1 35 H P Northway motor.....\$125.00
Model D 4 Bosch Magneto..... 30.00
B No. 3 Stromberg Carb, new..... 8.00
Auto Salvage Co.,
1436 Wabash Ave., Chicago.

FORE DOORS

AT

CUT PRICES.

To reduce stock we are offering big reductions on all our standard Fore-Doors. Write today and secure a bargain while they last.

Address Dept. A,
Auto Specialty Manufacturing Co.,
Indianapolis, Ind.

"GET BUSY SALE!"
Large automobile factory purchased outright! Everything at a price! Must move at once! Axles—Radiators—Steering Gears—Magneto—etc. Anything and everything! Send for bargain list.

Puritan Machine Company,
413 Lafayette Blvd.,
Detroit, Mich.

GUARANTEED RADIATORS

For all cars. The following is our stock list of radiators for the cars mentioned, subject to immediate shipment. Compare our prices with other lists.

Ford Model "T".....	\$18.00
Buick 10-32-33-14.....	27.50
Buick F-16-17-19-26-27-28.....	35.00
Buick 38-39.....	42.50
Hudson 20.....	33.00
Chalmers F-40.....	30.00
Lion 40.....	25.00
Warren 40.....	28.50
B-M-F 30.....	30.00
Flanders 20.....	30.00
Brush A-B.....	17.00
Anhut.....	15.00
Northern C.....	32.00
Wayne 30.....	35.00
Special 40 H. P.....	15.00

Terms: One-third cash with order, balance with order.

When ordering state year.

AUTOPARTS MANUFACTURING CO.,
453 Trombly Avenue Detroit, Mich.

GUARANTEED BATTERIES.

6 volt 140 Amperes.....	\$16.00
6 volt 80 Amperes.....	13.00
6 volt 60 Amperes.....	10.00

The Ampvo Battery Co.,
1607 Michigan Ave., Chicago, Ill.

GUARANTEED ELECTRIC HORNS, MADE by well-known manufacturer. Regular price \$8. Our price \$5. F. E. Alford, Goshen, Ind.

"IS YOUR FORD CAR SAFE?"

"No, it is not"
Without "Cranklock." Don't wait. Write today.
H. C. Fairchild, Mfr., Maplewood, N. J.

KEROSENE FOR AUTOMOBILES

Our new Model B uses successfully half and half mixture lowest grades kerosene and gasoline. Satisfaction guaranteed or money refunded. Greatly increased power; very slow speed on high. Starts easy at zero. Special agents' prices. Dept. B.
The Air-Friction Carburetor Co.,
Dayton, Ohio.

LAMPS, BLACK AND NICKEL, \$9.50 PER pair, worth \$20.00; bodies, four-passenger, fore-door, untrimmed, \$20.00; Stapley compound foot pumps, \$2.35. Get our bulletin. Automobile Appliance Co., 1712 S. Michigan Ave., Chicago, Ill.

LANDAULET BODY.

For any Straight sill. This body is in A No. 1 condition and will prove a bargain to the first purchaser.

Modern Autop Co.,
607 St. Claire Ave. N. E., Cleveland, Ohio.

LATEST FORD ROADSTER BODY, \$35. Tops, curtains included. Macinnis Bros., Toledo, O.

LAUGH AT TIRE TROUBLE.

Use Standard Tire Protectors. Tire expense reduced two-thirds. Write today for our valuable accessory catalogue.

New York & Brooklyn Auto Supply Co.,
1717-19 Broadway, New York.

LION REPAIR PARTS

We have on hand a complete stock of repair parts for all models of Lion Cars.
Lion Motor Parts Co.,
124 N. 3rd St., Philadelphia, Pa.



More Than Satisfied

"Please change our advertisement to read as per enclosed matter. Run until further notice. We have steadily secured excellent results from our ads in MOTOR AGE and are more than satisfied."

L. D. S.

LOSS OF POWER

Caused by
CARBON.

90% of all your engine trouble is the result of carbon in the cylinders. You can eliminate this by using M. H. B. CARBON REMOVER. Acts like magic. Apply it yourself. Instructions on every can. Guaranteed to do the work or money refunded. Price \$1.00 per quart prepaid. Use 2 ounces (liquid) to one gallon of oil. Dealers write for special proposition.

Interstate Mfg. Co., Inc.
Walliston, Mass.

LUBRICATE YOUR SPRINGS AND GET some riding comfort. When they become rusty and set they are like solid bars. The (TOWNSAN) Spring Lubricator is a finely finished flat-jawed tool for wedging the leaves apart, permitting lubricant to be inserted between. A tool for mechanics or thoughtful car owners. Price, postpaid, \$1.50. Townsan Auto Spec. Co., Mitchell, S.D.

MACHINE SHOPS AND GARAGE—OUR WELD IT ALL machines will weld perfectly any broken casting that has a melting point. Full particulars on Oxy-Acetylene welding machines sent on receipt of your address. Every machine fully guaranteed. H. D. Prose & Co., Wichita, Kansas.

MR. (FORD) OWNER AND GARAGE MAN The Townsan Valve Adjuster has a cushion for your valve-stems. Takes away the click, absolutely silencing the valves. No screws or burrs to work loose. Saves putting in new push-rods and valve-stems. They never wear out. Price \$1.50 by mail. Ask your jobber, or address Townsan Auto Specialty Co., Mitchell, S. D.

MORA REPAIR PARTS

We purchased the repair business of the Mora Company and have in stock repair parts for all models of Mora cars. Philadelphia Machine Works, 67 Laurel St., Philadelphia, Pa.

MAGNETOS: WE HAVE 2,000 MODEL X Splittorf Magnetos, new. Price, without coil, \$17.50 each; with coil, \$25.00 each.

The regular price of these is \$75.00. We also have other makes of magnetos at cut prices, in fact everything for the automobile. Send for "OUR PRICE WRECKER"—the greatest money-saver in the world.

TIMES SQUARE AUTO CO.
1210 Michigan Blvd., Chicago, Ill.
S. W. Cor. 56th St. & Broadway, N. Y. City.

NEW FOREDOOR 5-PASS. BODIES, trimmed and painted.....\$75.00
5-pass. metal bodies, unfinished..... 10.00
Splittorf spark plugs, per four..... 1.60
Stamwood steel running boards, 3 1/2"x 48"..... 1.00
Martindale & Millikan, Franklin, Ind.

ONE MODEL 121 SPECIAL BOWSER GAS Wheel Tank for sale.
North Iowa Motor Sales Co.,
Mason City, Iowa.

OUR AD IN THE CLEARING HOUSE SEC- tion will interest every owner of brass trimmed cars. Just turn to page 117 and look it over, we know it will interest you. Look for the name QUICK-KNICK.
Forest City Sales Co., Fremont, Nebr.

OXY-ACETYLENE WELDING AND CUT- ting Machine. The Admiral Welding Machine is built by men who know; large capacity; self-generating; portable; perfect for all classes of work. Send for booklet, "Welding and Cutting." Price, with Welding and Cutting Torches, all Filler Rods, Fluxes, Chemicals, etc., ready to begin earning big money, \$250.

We do expert welding; prices right.
Admiral Welding Machine Co.,
1331 Walnut St., Kansas City, Mo.

RADIATORS—NEW GUARANTEED GOODS

Ford, Model T.....	\$16
Buick Model 10.....	22
Buick Model F.....	25
Chalmers-Detroit.....	29
Everett.....	20
Stoddard-Dayton.....	25

Any other make required at equally low prices.

Times Square Automobile Co.,
1210-1212 Michigan Ave., Chicago.

RADIATORS

To order for all cars.

We use copper fins and tubes. You can buy brass cheaper, but the cooling efficiency is not there.

Black enamel, baked finish, \$2.00 extra. Terms cash with order, or one-third deposit with C. O. D. shipments. \$5.00 Trade Allowance for old radiator shipped in F. O. B. Detroit.

Ford Model T.....	\$22.00
Ford Model B, S. & N.....	28.00
Hupmobile 1910-1911.....	28.00
Hupmobile 1912-13.....	38.00
Warren 1910-1911-1912.....	35.00
Packards to sample, \$50 to.....	65.00
B. M. F. 30.....	35.00
Flanders 20.....	30.00
Patterson 30.....	35.00
Buick 10-14-32-33.....	30.00
Buick 16-17-19-26-27-28.....	35.00
Hudson 20.....	32.00
Hudson 33.....	40.00
Cadillac 30.....	35.00
Paige 1910-1911.....	28.00
Paige 1912.....	30.00
DeTamble 1910—a few.....	15.00
Bullet Electric Lamps, per pair.....	12.00
Prest-O-Lite covers, doz.....	4.50
12x34 round gasoline tanks, each.....	3.00
28x13x8 square gasoline tanks, each.....	3.00
14-inch round to specification.....	10.00
16-inch round to specification.....	11.00
18-inch round to specification.....	12.00
Last three with 3 1/2-in. filler with hex or horned cap.....	
17-in. Niagara folder, cost \$19.....	10.00
30x2 tinnies' rolls, cost \$20.....	12.00
HURON RADIATOR & LAMP COMPANY, 253-255 Jefferson Ave., Detroit, Mich.	

REAL BARGAINS IN MOTORS

Unit power plants, radiators for all standard makes of cars. Windshields \$7. Side oil lamps, brass or black, \$2.75 pair. Gas or electric head lights, 8 1/2 to 9 inches, \$6 per pair. \$1 spark plugs 20c. Universal joints, steering gears and other parts for cars at bargain prices. Write today to
Nichols Company
424 Grand River Ave.,
Detroit, Mich.

RUNELVA AUTOMOBILE BODY POLISH.
Guaranteed absolutely harmless. Transforms that smoky, dull appearance into a beautiful lustre. Leaves no greasy surface to collect dust. A trial will convince you. Quart can PREPAID only 80 cts.
RUNELVA POLISH CO., LACON, ILL.

REMOVAL SALE.

We Are Going to Move to Our Eight-Story Building.

Special Prices for the Next Thirty Days.

Four-cylinder Ohio motors.....	\$100.00
Four-cylinder Mitchell motors.....	100.00
Two-cylinder opposed American motor	35.00
Four-cylinder Cameron motor.....	60.00
Two-cylinder Davis motor.....	70.00
Randolph truck motor, new.....	60.00
Sears motor	35.00
Four-cylinder Continental motor.....	60.00
Two-cylinder Sullivan motor.....	50.00
Two-cylinder Northern motor with transmission and carburetor.....	65.00
Four-cylinder 50 h. p. T head motor..	90.00
Olds sliding gear transmission.....	60.00
Brown-Lipe Unit Power plant transmission and clutch.....	70.00
Cone Clutches	15.00
Timken shaft drive rear axles.....	100.00
Timken I beam front axles.....	30.00
Stone-Probst shaft drive rear axle with sliding gear transmission.....	75.00
Sheldon truck axles.....per pair	40.00
Lion 40 shaft drive rear axles.....each	40.00
Lion front axles, I beam.....each	15.00
Randolph truck wheels, nearly all sizes	1.50
Artillery type wood wheels, all sizes	3.00
Q. D. clincher rims, all sizes.....each	1.50
Delivery wagon bodies, open, top, each	5.00
Jackson fore-door bodies, upholstered.	60.00
Five and seven-passenger tops, mohair and pantasote.....	18.00
Seven-passenger limousine body fitted to Abbott 44.....	500.00
Windshields, all brass, nearly all sizes.	7.50
Gasoline tanks, nearly all sizes.....	1.50
Tires, 34x3 1/2.....	
Guaranteed tires, 10%, 7% and 5% from the list.	
Ford raidators, model N, R and S.....	24.00
E. Z. Presto-Lite starters.....each	4.00
Enameled fenders.....per set of four	8.00
Mufflers with cut out.....each	2.00
Remy magneto terminals fitted with wire .....	.25
Barnes steering gears.....each	10.00
Overland roller bearings.....each	.50

Send for our removal sale Bargain Sheet of supplies.

Auto Parts Co.

513-31 Jackson Blvd.

Chicago, Ill.

SCHLEBLER MODEL "L" CARBURETORS, new, 1 1/4 or 1 1/2-inch, \$8.00 each. Order early. Kent Motor Car Co., Kenosha, Wis.

SEAT COVERS FOR ALL CARS—SPECIAL price on Fords. We clean old covers; make them look like new. Auto Cape Top Co., 2334 Michigan Ave., Chicago.

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UNION OXY CARBIDE CO. Manufacturers of Portable (weight 40 lbs.) and stationary welding, cutting or lighting plants; supplies of all kinds. Agents wanted. Fulton & Enfield Sts., Brooklyn, N. Y.

WE NOW HAVE BUT A FEW 30-35 AND 35-40 H. P. motors ready for shipment. Complete with magneto, coil and clutch. F. E. Alford, Goshen, Ind.

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5 1/2x5 TWO-CYLINDER DAVIS TRUCK motor with magneto coil and carburetor, practically new, \$200.00. Power Equipment Co., Minneapolis, Minn.

50 NEW PRESSED STEEL FRAMES 163" long, 34" wide. Each \$10.00. Send for sketch.
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FOR SALE OR TRADE — OKLAHOMA farm for a car. 160 acres nice level land, best of soil, all fenced and comfortable house in a good farming country. No incumbrance and title good at \$20.00 per acre. No less. Will take a car as part payment if in good running order and priced right. Don't write, but come and see. Reference, the Bank of Texline. A. L. Stone, Texline, Tex.

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Will Pay Cash for New or Used Magnetos.
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"I have filled the positions referred to, and have received numerous applications, so discontinue the ad. Rest assured that when we need additional salesmen, we will take pleasure in giving you the advertisement." E. H. C.

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A. Presto Tanks (large).....\$9.00
B. Presto Tanks (medium).....7.50
C. Presto Tanks (small).....6.00
Ship in any quantity C. O. D. or S. D. B. L.
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WANTED—REAR AXLE AND TRANSMISSION combined for 40-h. p. touring car; must be in first class condition and cheap. Glass Bros., St. Marys, Pa.

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Highly competent executive, experienced organizer and sales producer, thoroughly conversant with trade conditions, desires new connections as branch manager or factory sales manager. Has held present position as branch manager for two years with a record of 60% increase in sales during current season. Best of reasons for desiring change. For full particulars address Box D 451, care Motor Age.

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SALESMEN—TO CALL ON CAR OWNERS in the city of Chicago to explain CHEMICAL RUBBER (SYNTHETIC RUBBER) THE PERFECT TIRE FILLER.
1339 Michigan Avenue, Chicago.
Chas. Weichselbaum, Sales Manager.

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60 HIGH GRADE MEN WANTED For all lines of the automobile industry. The Toledo Engineering Agency, Toledo, O. H. L. Croy, M. E., Mgr. Member S. A. E.

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AGENCIES WANTED.

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FOR SALE—A GARAGE 50x116 FEET in town of 2,000; only garage in town; 2 car agencies; sold 45 cars so far this season; good machine shop and large accessory line; takes about \$12,000 to handle business. Owners have other business that requires their time. Address Lemmon Auto Co., Lemmon, S. Dak.

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FOR SALE—THRIVING GARAGE BUSI-ness in fine light building, housing 20 cars and equipped with gasoline engine, lathe, drill press, emery wheel, grindstone, arbor press, drills, reamers, wrenches, etc. Everything in first-class condition. Address Box D 458, c/o Motor Age. m

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32x3 1/2	16.00	35x4 1/2	28.00
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32 x 3 1/2	12.00	3.35
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I will sell you good wrapped tread clincher tires cheaper than any one in the United States. New 1913 stock. 34x4 Case, \$14., all other prices accordingly. Write for prices.

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new pistons and rings fitted. Garage Air Compressors. Cast Iron Brazing Co., Manchester, N. H.

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with new pistons and rings for \$7 to \$11 per cylinder. We do this class of work exclusively and are thus able to give you the highest class of work at these prices. The Crown Machine Shop, Crown Point, Ind.

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and rings fitted, gear cutting, of all kinds and materials, transmission and bevel gears, piston pins and push rods of chrome nickel steel, hardened, tempered and ground; guaranteed better than factory; old piston pins reground and fitted to your new pistons; old push rods reground and furnished with new guides, crank shafts, connecting rods, valves, crank cases, any part for your auto or motor; reproduced same as original but better; phosphor bronze bushings carried in stock. Send old or broken parts to go by. The shop of quality.

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cylinders, flywheels, gear teeth, pistons perfectly welded and machined, ready to replace. Scored cylinders made new. Booklet. Atlas Welding Works, Rahway, N. J.

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CLEARING HOUSE

Continued from Page 117

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Air drying with a high gloss finish on lamps, radiators and fenders. Will not crack, chip or peel.
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Heavy bodied, air drying. No primer or undercoat required.
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32x3	7.75	34x4	17.00
30x3 ½	10.50	35x4	17.50
32x3 ½	11.50	36x4	17.00
34x3 ½	12.00	35x4 ½	24.00
30x4	14.75	36x4 ½	25.00
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We Ship on Approval

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Regular price \$1250 Our price \$713

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1 Ton., 4 Cyl., Continental Motor, Etc.
Regular price \$1850 Our price \$895

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The Marvel of the Season
Regular price \$1750 Our price \$885

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Nothing Better Built
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Everything for Your Automobile At Half Price

New Bodies, roadsters \$40.00
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And others at equally low figures.

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Strictly reliable. Will start your car every time.
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and development of new ideas will receive our prompt attention. We have an entirely new equipment of turret lathes, broaching machines, worm and worm gear machines, lathes and other necessary tools, so that large contracts can be handled to advantage by us. Send blueprints or samples of articles you want manufactured, and we will give you figures on such articles, ready to ship.

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Have a beautifully nickel plated car. Make her look just like a \$5000.00 one. It's just as simple; you can do it all in the time it takes to polish brass, and then you're done. No more brass polishing. Not a cheap silver or mercury wash, but a real permanent plate, that will wear as long as your car. Remember: QUICK-KNICK does it. The only plater that is absolutely reliable. Price \$2.00 complete, at your dealer's or send to us. Remember the name and insist upon QUICK-KNICK.

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Sil-Cote cleans and polishes the nickel and deposits a coating of pure silver on all parts where the brass shows through. Changes brass to silver plate with one application. If your dealer has none, take no substitute. Send 25c for trial size of genuine Sil-Cote. Other sizes—½ pint, 60c; 1 pint, \$1; 1 quart, \$1.75; ½ gallon, \$3. Dealers write for agency proposition.

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Quality at a Minimum Cost
Every One Guaranteed

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We will not build a radiator in our factory that is not honestly and scientifically designed to do the work required of it. Our continued business relationship with the makers of America's best cars, year after year, offers abundant testimony of the soundness of this policy.

The Mayo Radiator Co.
New Haven, Conn.

Veeder

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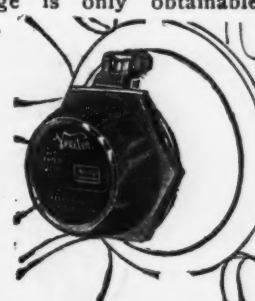
won't do, if you want to know the *exact cost* of upkeep of pleasure or commercial vehicle. Mileage must be correct to a fraction if you are interested in tire, gasoline or "juice" and lubricating consumption. Exact mileage is only obtainable with a VEEDER HUB ODOMETER — which *can't be tampered with.*

Neat, durable and compact, it can be easily attached. Price complete, **\$25.00**

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C. M. VEEDER, President; D. J. FOST, Treasurer

H. W. LATER, Secretary

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Makers of Cyclometers, Odometers, Tachometers, Tachometers, Counters and Small Die Castings

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IS CARED FOR BY THE BEST SERVICE

Packard service means ability plus willingness to serve. Every Packard owner commands free of charge the services of a technical expert in inspecting his car and making minor adjustments. Packard dealers take the initiative in keeping cars running to the entire satisfaction of the owners.

Each dealer carries a carefully selected line of parts in stock and maintains a service department with all facilities for keeping Packard cars and trucks at their high point of efficiency.

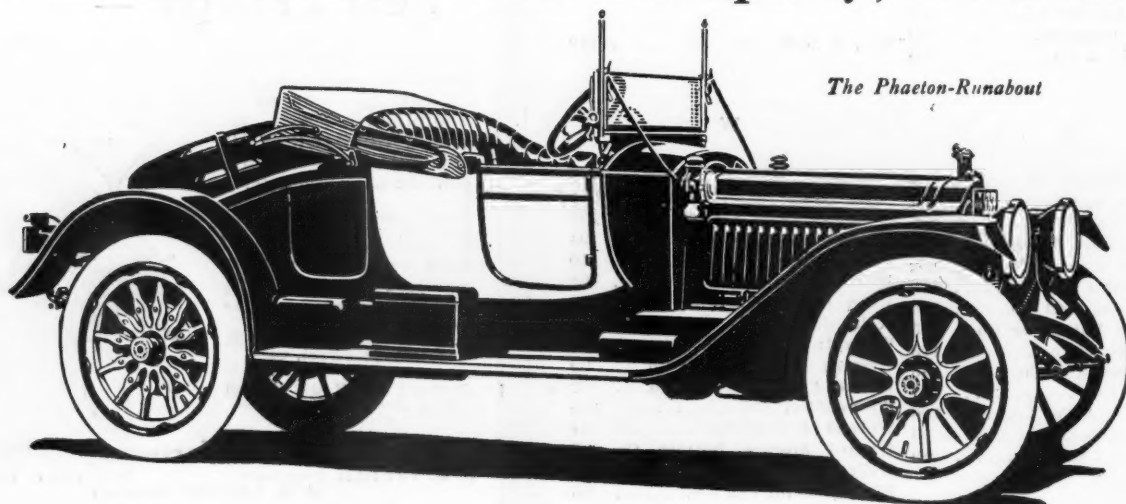
For Packard owners who tour abroad, the Packard Motor Car Company of Paris maintains a complete service depot at No. 5 Rue Newton, Paris.

In all Packard establishments the same consideration is extended to every Packard owner regardless of his place of residence or where he purchased the car.

Packard service follows the car:—one of the reasons why a Packard Six bought this year will have a higher relative cash value next year or five years hence than any other car purchased at the same time.

Ask the man who owns one

Packard Motor Car Company, Detroit



The Phaeton-Runabout



The New Baker Electric Roadster

Can you imagine an open-body type which will appeal more strongly to every man and woman than this magnificent new Baker Roadster?

It gives the man a dependable, troubleless, speedy, economical car for business uses. It appeals to the social needs of the family through its rich appointments, graceful lines, its cleanliness, and because every one of the family can drive it. No chauffeur is needed. It is simple, convenient, and has a good mileage radius. No other open-body electric is such an admirable all-around car as this new Baker Roadster.

It is a Baker. That establishes its mechanical excellence, for Baker Broughams and Coupes have always been the leaders in the electric field. They have established a standard by which all other electrics are judged.

This new Baker Roadster has either wheel or lever steer; 34-cell battery; standard Baker motor and shaft drive, famous for current economy; complete set of lamps; side curtains; Weston Volt Ammeter; shaft odometer; kit of tools; Tuto horn; rain vision wind shield; metal fenders curtained to frame. It is richly upholstered in blue leather, with gray-striped blue body and running gear.

For the few valuable territories still open we solicit correspondence with those who are in position to represent the magnificent Baker line in the manner its standing deserves. We should like to show you the great possibilities this line presents, supported as it is by our strong service backing. Write for our proposition.

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Builders also of Baker Electric Trucks

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QUICK
DETACHABLE
RIMS

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First and second place in the historic French event held last Saturday won by two Peugeot cars—*both equipped with RUDGE-WHITWORTH WIRE WHEELS.*

Cars equipped with these wire wheels won every trophy at Indianapolis this year.

And they were the winners at the Brooklands (England) Track last spring.

The great national motoring events of three nations—England—France—America—won by cars equipped with RUDGE-WHITWORTH WIRE WHEELS.

"Alexander wept for new worlds to conquer!"

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